CONTRIBUTIONS TO THE KNOWLEDGE OF THE REPTILES OF THE KARROO FORMATION

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6. FURTHER DINOSAURIAN MATERIAL IN THE TRANSVAAL MUSEUM.

With 13 plates and 27 text-figures.

Eucnemesaurus fortis n.g. et sp.

The remains to be described under this name were collected by myself from a red mudstone, probably belonging to the Red Beds, on the farm Zonderhout, near the railway station of Slabberts. High above the locality is a krans of, probably, Cave Sandstone. The remains consist of the proximal half of a femur, a complete tibia, a proximal portion of a pubis, portions of dorsal and caudal vertebrae and some fragments.

Dorsal Vertebrae.

There are portions of three dorsal vertebrae. One centrum belonging to the region between the tenth and the fourteenth, a portion of a neural arch, which belongs to one of the vertebrae from the seventh backwards, and a neural arch which probably belongs to the sixth vertebra.

The neural arch of the sixth vertebra is very much weathered. The anterior supporting ridge is narrow and in its turn supported by a smaller ridge, which starts near its upper end, runs downwards and nearly parallel to the posterior supporting ridge and disappears before reaching the centro-neural suture. There are deep cavities on both sides of this ridge. The sutural surface of the centro-neural suture shows a transverse groove in the middle. The breadth of the neural canal is 1·5 cm. posteriorly and 2 cm. anteriorly. Its height above the sutural surface is 2·5 cm.

In the other neural arch there is probably only one supporting ridge for the processus transversus. It is too fragmentary to merit detailed description. The centrum (Pl. XII, figs. 3 and 4) is large. Its length is about 10·5 cm. It has suffered from pressure, for one side is longer than the other and its lower surface shows signs of compression. The height of its anterior and posterior articulation surface is 11·5 cm. The breadth of the anterior surface is 12 cm. and of the posterior surface it may have been 13 cm., but this cannot be measured, because the right border of the posterior end is broken off. The posterior articulation surface is more concave than the anterior one. There is a deep longitudinal groove on both sides of the centrum and above its middle. There is a large knob on the upper anterior corner of the side of the centrum; this is a portion of the anterior supporting ridge of the processus transversus. The thickness of this knob suggests that this vertebra may be the thirteenth or the fourteenth. The articulation surfaces of the centro-neural suture are broad. A ridge runs transversely across their middle. The breadth of these surfaces in the middle is 3 cm. The neural canal is very deep in the middle of the vertebra. The bottom of the deepest part is divided in two by a ridge. The breadth of the neural canal in the middle is 1·3 cm. Its depth below the centro-neural sutural surface is 3 cm.

CAUDAL VERTEBRAE.

Remains of four caudal vertebrae are present (Pl. XIII, fig. 1). One of these is apparently the greater part of the fourth caudal. Its distal articulation surface is broken off. The concave anterior articulation surface has a height of 9 cm. and a breadth of 8·5 cm. Its lower border is much thicker and broader than the sides; this is for articulation of the haemapophysis. The centrum is thickest immediately below the transverse processes, where it measures 5 cm. The sides converge downwards, and as far as can be made out, the lower surface is rounded. If the anterior articulation surface is placed vertically, the upper surfaces of the broken off transverse processes slope backwards and downwards. The praezygapophyses are broken off. The anterior edge of the processus spinosus starts somewhat in front of the middle of the bone and slopes upwards and backwards. This front edge is concave. The section of the base of the process is wedge-shaped. The base of the transverse process is very broad. It starts at about 3 cm. from the anterior edge of the centrum. Its thickness on the left side is 1·8 cm.

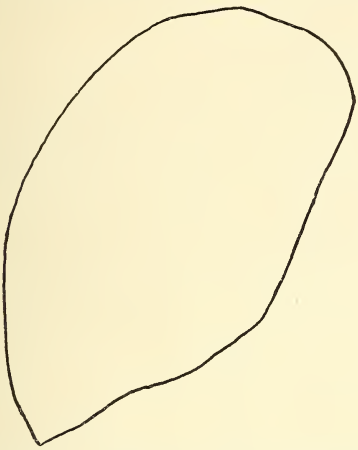
Two others are from the middle caudal region and perhaps from the twelfth to the sixteenth. The posterior one of the two has lost its anterior half and its dorsal spine. Its concave posterior articulation surface has a height of 6 cm. and a breadth of 5·5 cm. The hinder border of the left transverse process lies 2 cm. in front of the hinder border of the centrum. The anterior one of the two has lost a piece of its anterior articulation surface. The length of its centrum is 7·8 cm. above and 6·2 cm. below. The anterior articulation surface is more concave than the posterior one, but this may be due to the developing, because there was scarcely any difference between the bone and its incrustation. The transverse process is attached about 0·5 cm. in front of the posterior border of the centrum. The height of the anterior articulation surface is 6 cm. The height of the posterior surface is slightly less and its breadth 5·3 cm.

The fourth vertebra belongs to the end of the middle caudal region. It is too much weathered to give any detail. The length of the centrum was at least 6 cm. and its height at least 3·5 cm. There is a transverse process which has a proximal breadth of 2 cm. The processus spinosus stands on the distal half of the bone.

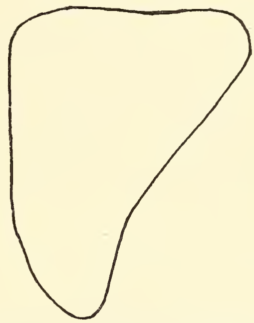
PUBIS.

Two pieces of the left pubis are preserved, the distal and the proximal end. The proximal end (Pl. XI, figs. 3 and 4, and text-fig. 1) consists of the neck with the processus subacetabularis. The distal end of the piece still belongs to the pubic plate. The inner side of this end is bent down. The section at the distal fracture is a flat oval, the inner end of which is elongated and ultimately broken off. The neck gives the impression of being peculiarly short. Its section differs greatly from that of the pubic neck of *Dromicosaurus gracilis* described hereafter. Through lack of material and literature it could not be made out whether this difference is of family value. There is no demarcation between an anterior and a medial surface of the neck. A section shows a regularly convex line from the medial border of the neck over the medial and anterior surfaces to its lateral border. The neck has a distinct lateral surface, which broadens rapidly into the lateral surface of the proximal end, and which narrows down rapidly into the lateral border of the plate. This lateral surface of the neck rounds off broadly into the hinder surface, which is concave in all directions. The greatest breadth of the neck, from the inner to the lateral border, is 6 cm., while its greatest thickness, measured at the upper fracture (see Pl. XI), is 3 cm. The inner portion of the neck is thin and bent backwards.

The lateral border of the neck is slightly concave forwards. This border broadens out proximally into the broadly rounded upper anterior corner of the bone. The medial surface of the upper end is convex antero-posteriorly, but concave from above downwards. Its lateral surface is concave. The articulatio ileo-pubica is broad and slightly twisted. The upper anterior portion



Text-fig. 1. Outline of transverse section through left pubic neck of *Eucnemesaurus fortis* in the region of the proximal fracture (Pl. XI). Seen from the distal end. The anterior border is above and the medial border on the left-hand side. Nat. size. The slight concavity in the lower border deepens rapidly towards the distal end.



Text-fig. 2. Outline of transverse section through left pubic neck of *Dromicosaurus gracilis* near the upper end of the foramen obturatorium. Seen from the distal end. The anterior border is above and the medial border on the left-hand side. Nat. size.

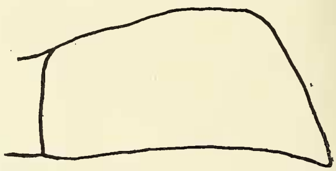
of the lateral border of the proximal surface is higher than that of the medial border, while the lower posterior portion of the lateral border, just before reaching the groove, is lower than the corresponding medial border. The processus subacetabularis is broken off through the groove on the proximal surface. This groove has a depth of 1·5 cm. and does not reach the medial border. The medial border of the proximal surface is evenly convex, while the lateral border is slightly concave. One gets the impression from the proximal end that its posterior portion is slightly twisted to the lateral side. The fractured end of the processus subacetabularis shows a convex lateral and a slightly concave medial border. Taken generally, the section at this end is triangular.

The distal end (text-figs. 3 and 4) is very much weathered. A portion of the rounded lateral side is still visible. Its breadth as preserved is proximally 9 cm. and distally 7·5 cm. Its thickness is 3·5 cm. The greatest breadth of the distal surface as preserved is 4·5 cm. The medial-hinder-lateral border of the distal surface forms practically half a circle. Its front border is straight. The distal surface makes an acute angle with the anterior surface. I wish to lay stress on the fact that the anterior surface is the only one which is not weathered.

FEMUR.

Only the proximal half of the left femur is preserved (Pl. XII, fig. 1 and text-fig. 5). The piece is broken off through the trochanter quartus. The length of the bone as preserved is 26·5 cm. The breadth of the proximal end, measured from the medial end of the caput femoris to the lateral side, is 15·5 cm. Its maximum thickness, measured medially to the trochanter minor, is 9 cm. The caput femoris is directed inwards; it has a breadth of 8·5 cm. and a height of 8·5 cm. The proximal surface is convex, rough and pitted, and forms an angle with the lateral side. The trochanter minor lies on the hinder surface and very near to the border of the proximal surface. It is a thick broad boss, the middle of which is situated at 8·5 cm. from the medial end of the caput femoris and at 6·5 cm. from the lateral side of the bone; in this therefore it differs from the trochanter minor of most *Plateosauridae*, which is there situated much nearer to the medial than to the lateral side. The height of the trochanter minor is 1 cm., its length is about 6 cm. and its breadth about 5 cm.

Text-fig. 3. *Eucnemesaurus fortis*. Outline of distal surface of left pubis. The anterior border is below, the lateral border to the left. $\times \frac{1}{2}$.

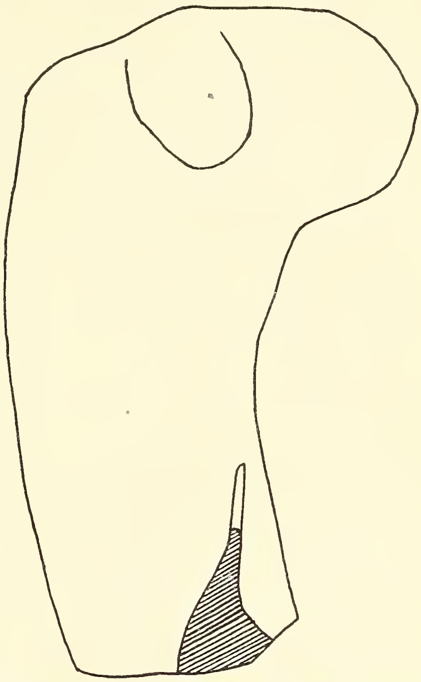


Text-fig. 4. *Eucnemesaurus fortis*. Outline of longitudinal section of distal end of left pubis. Distal border to the right, anterior border below. $\times \frac{1}{2}$.

The upper end of the trochanter major is situated at a distance of 12 cm. from the proximal end of the bone. The ridge of the trochanter is worn away, but it is still plainly visible that its lateral side formed a deep, broad groove with the general surface of the bone. The height of the trochanter near its proximal end as preserved is 2·5 cm.; it may originally have been 1 cm. higher. The length of the trochanter is about 10 cm. The femur is broader and thinner between its proximal end and the trochanter major than further downwards. A broad thick ridge runs from the trochanter major downwards apparently in the direction of the condylus medialis. This ridge continues upwards from the trochanter, but diminishes gradually in height and loses itself at about midway between the trochanter and the proximal end of the bone. The ridge is concave on its medial side opposite the trochanter major. The trochanter does not lie on the top of the ridge, but is situated on its lateral side. The medial side of the anterior surface of the bone is concave as far as preserved. The lateral side of the anterior surface, below the trochanter major, is convex. The medial side of the proximal end of the bone is concave, while its lateral side is slightly convex. Therefore, the upper end of the bone is turned slightly inwards. The hinder surface of the proximal end was originally flat; now it is irregularly concave through pressure. Opposite the trochanter quartus it rounds off, over the lateral side, into the anterior surface. Higher up, the lateral side is flatter and its borders with the anterior and posterior surfaces are more conspicuous.

The trochanter quartus begins at a distance of 17·5 cm. from the proximal end of the bone. Only a small portion of the trochanter is present; the lower half of the trochanter and the whole of its upper edge are lost. The portion preserved has a maximum height of 4 cm. Its breadth at the base, just above the fracture, is about 5·5 cm. The medial side of the trochanter is concave and the lateral side convex. Nothing is visible of a second upper ridge, but this may be due to crushing. The trochanter is situated nearer to the medial than to the lateral side of the bone. The breadth of the diaphysis over the trochanter is 9 cm. Its thickness, measured from the top of the upper end of the trochanter quartus as preserved to the top of the ridge on the anterior surface, is 12 cm.

The section of the bone, which is revealed at the fractured end, is remarkable. The fractured surface has been polished and its photograph is given in fig. 2 of Pl. XII. It shows a thick wall of substantia compacta which is clearly lamellar. Sharply defined from this is an inner mass of substantia spongiosa. Only a small portion of the whole section is not occupied by bony matter. Here we have, therefore, a *Theropod* femur of practically solid structure. ZITTEL in his "Handbuch" (**1**) states on p. 718 that the limb-bones of all *Theropoda* are hollow and were perhaps filled with air. In EASTMAN'S Textbook it is stated in the diagnosis of the Sub-Order *Theropoda* (**3**, p. 227) that the limb-bones are hollow. v. HUENE, in his great work "Die Dinosaurier der europäischen Triasformation," compares the *Theropoda* with the *Sauropoda* on p. 346, and says: "The limb-bones of the *Sauropoda* are not tube-like, but nearly completely massive, whereas those of the *Theropoda* are hollow." In the second edition of ZITTEL'S handbook in 1911, BROILI states in the diagnosis of the Sub-Order *Theropoda* that the limb-bones are mostly tube-like. Probably, therefore, BROILI knew of *Theropod* limb-bones which were not hollow, and our femur now adds to the evidence.

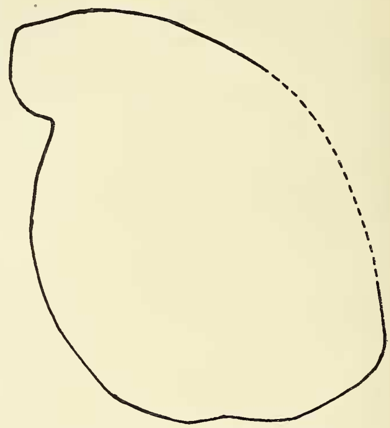


Text-fig. 5. *Eucnemesaurus fortis*. Outline of the posterior view of the proximal end of the left femur, showing the position of the trochanter minor and the upper end of the trochanter quartus. $\times \frac{1}{3}$.

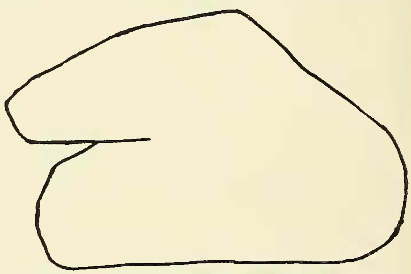
TIBIA.

The left tibia (Pl. XI, figs. 1 and 2, and text-figs. 6 and 7) is complete. It has a very large proximal articulation surface and a straight shaft. The bone was found in five pieces, which all fitted neatly together. The total length of the bone is 46 cm. The head of the tibia has a length of 19·5 cm., measured from the hinder end of the medial condylus to the anterior edge of the tuberositas tibiae. Its greatest breadth, transverse to this greatest length, is 13·5 cm. The length of the lateral side of the head is about 15 cm. Anteriorly the head of the tibia has a laterally directed process, the tuberositas tibiae. The lateral border of the proximal articulation surface is slightly convex at the tuberositas, more convex around the lateral condylus and sharply concave in between. The medial border runs from the tuberositas tibiae inwards and curves gradually backwards; the posterior part of this border is not so convex as the anterior portion. The posterior border is convex behind each condylus and notched in the middle; this notch is still filled with matrix.

The proximal articulation surface is roughly convex, with small concavities in its anterior portion. The lateral posterior side of the surface is lower than the medial posterior corner and this again is slightly lower than the anterior end. The hinder border is overhanging. The shape of the proximal articulation surface is given in text-fig. 6. The shaft narrows down quickly immediately below the head. The distal end is transversely broad. The medial one-third of the distal articulation surface is more or less flat and slopes very slightly from its anterior edge backwards and downwards. The anterior part of this surface is convex. The lateral part of the distal articulation surface consists of an anterior and a posterior portion. The anterior portion, which is the distal surface of the processus tibiae anterior distalis, occupies a much higher position than the posterior portion, which is the distal surface of the processus tibiae posterior distalis. The distal surface of the processus posterior is continuous with the medial portion of the articulation surface. It slopes upwards from the lateral to the medial side and from the anterior towards the posterior border. As the processus posterior is rather weathered, especially laterally, the last fact might be due to this cause. If it is original, it would be a marked difference with the tibia of *Dromicosaurus gracilis*, where the surface slopes upwards from the posterior towards the anterior border. The medial end of the distal surface of the processus anterior slopes down gradually towards the medial portion of the articulation surface, with which it joins up by means of a broadly convex ridge. The distal face of the processus anterior slopes from its medial end upwards and outwards and from its anterior border backwards and slightly upwards. Medially the processus posterior is slightly broader than the processus anterior. It is bluntly pointed towards the lateral side. Laterally it is bent very slightly forwards. Both ends of the distal surface of the processus anterior are broad, but the inner end is slightly broader. The lateral end of the processus does not project further outwards than the processus posterior. The highest point of the lower surface of the processus anterior is situated 46 mm. above the lowest part of the processus posterior. The sulcus malleoli tibiae is very deep. This sulcus begins rather far above the processi and passes down between them towards the hinder border of the processus anterior. The greatest breadth of the distal end, parallel to the front border, is 14·5 cm. The front border is laterally slightly concave and medially convex. The medial border makes an acute angle with the anterior border and an obtuse angle with the posterior border. The anterior medial corner is globose;



Text-fig. 6. *Eucnemesaurus fortis*. Left tibia. Outline of proximal articulation surface seen from above. Lateral side to the left. $\times \frac{1}{3}$.



Text-fig. 7. *Eucnemesaurus fortis*. Left tibia. Outline of distal articulation surface seen from below. Lateral side to the left. $\times \frac{1}{3}$.

its medial and anterior sides are slightly overhanging. The medial border rounds off into the posterior one. The greatest breadth of the medial side is 11 cm. The posterior border converges slightly with the anterior border towards the lateral side; its length is 10 cm. The distance from the anterior medial corner of the distal end to the lateral end of the processus posterior is nearly 16 cm.

A broad high ridge runs down from the tuberositas tibiae in the direction of the anterior medial corner of the distal end, but disappears in the lower half of the bone. The lateral anterior edge of the distal end is broadly rounded below. Higher up the edge becomes a fairly sharp ridge, which disappears above the middle of the bone. There is a broad low boss on the lateral side of the bone, below the notch in the lateral border of the proximal surface. Its highest point lies about 8·5 cm. below the notch. The surface of the bone being generally crushed, no further particulars can be given. The thickness of the bone in the middle is 7 cm. and its breadth at this place 5·5 cm. Both dimensions were originally somewhat larger. The thickness of the distal end is slightly more than 9·5 cm. At the middle fracture the bone shows a thick wall of substantia compacta but no substantia spongiosa. The central cavity is fairly large.

There are three fragments of the same specimen which could not be identified with certainty. One of these is probably a piece of the shaft of a femur. Another piece might be identifiable if better material were present for comparison. The third piece is an end of a large bone. The surface at the end has a length of 17·5 cm. and a breadth of 11 cm. At one end the sides of this surface meet at an acute angle; at the other end its border is broadly rounded. The shaft becomes rapidly narrower and at a distance of 10 cm. from the end its breadth is 8·5 cm. Its thickness at this point may be about 5 cm. The only bones it could belong to are the ischia and the fibulae. For the distal end of the ischium it is far too large, but for the distal end of the fibula it also seems too large. Its shape is exactly what one would expect of the distal end of the fibula.

Two other bones were found in the same locality, which belong to a much larger animal. One is a fragment of a tibia and the other of a coracoid. The tibial fragment was found loose on the same spot as the remains described above. It has probably broken away from higher strata. The coracoid was found loose on a very much higher level and was probably originally in the same conglomeratic bank as the tibial fragment.

The fragment of the tibia is the lateral portion of the head of the right bone. It has a length of 22 cm. corresponding with about 13 cm. in the tibia of *Eucnemesaurus*. In comparison with the head of the *Eucnemesaurus* tibia the head under discussion may have had a total length of 33 cm.

The coracoid consists only of the foramen supracoracoideum with some bone substance around it. It is apparently a right coracoid. The foramen passes upwards and inwards. Its outer opening is oval shaped, having a width of 3·5 cm. and a height of 2·8 cm. The inner surface below and behind the foramen is concave, the outer surface convex. The thickness of the bone immediately behind the foramen is 3 cm. It becomes thinner towards the scapular border. Immediately in front of the foramen the bone has a thickness of 6·5 cm. Both these bones indicate *Theropodous Dinosaurs* of tremendous size.

DISCUSSION.

The described remains of the smaller animal show *Plateosaurid* characters, and especially is the tibia so typically *Plateosaurid* that I do not hesitate in placing the described form in that family. It will, however, be necessary to compare it with the different forms grouped together under this name and with those without fixed position; perhaps also with some *Anchisaurid.*

The South African *Plateosaurid Euskelesaurus* is known by some fragmentary remains. Only a few of the bones can be used in comparison and among these the femur is the most important. Now the femur of *Euskelesaurus Browni* is incomplete, both ends being broken off and only the diaphysis with the trochanter major and trochanter quartus being present. Comparison is therefore rather difficult.

In *Euskelesaurus Browni* the trochanter major lies 15 cm. below the present proximal end of the femur. From the figure given by v. Huene (**4**, p. 30) it is manifest that the upper end of the trochanter quartus lies from 26 cm. to 28 cm. below the proximal end of the bone. In our form the distances of trochanter major and trochanter quartus from the proximal end are 12 cm. and 17·5 cm. respectively. From these measurements can easily be deduced that in *Euskelesaurus Browni* the trochanter quartus lies relatively lower than in our form. Of course the relation will change if the missing portion of the head is added. Now one cannot say exactly how much of the head is missing, but let us for one moment suppose that the relations were the same in both bones. To get the same relations as in our form, 9 cm. would have to be added to the proximal end of the femur of *Euskelesaurus Browni.* The distance of both trochanters from the proximal end would then be 24 cm. and 35 cm. respectively; these distances would therefore be twice the same distances in our form. v. Huene estimates that not much more than 5 cm. is missing from both ends together, and 9 cm. is therefore far above his estimate. The distal end of the *Euskelesaurus* femur is missing and if some 10 cm. are added for the missing part the whole bone would then have a length of $9+65+10=84$ cm. According to the above relations our femur would have to be half the size of the *Euskelesaurus* bone and therefore have a length of at the most 42 cm. That is at least 4 cm. shorter than the tibia! On the other hand the lower end of the trochanter quartus in our form was situated at least 28 cm. from the proximal surface. This distance can certainly have been greater. In *Euskelesaurus Browni* the lower end of the trochanter quartus lies about 40 cm. below the present proximal end, and if 9 cm. are added to this end, the distance of the trochanter quartus from it will be 49 cm. To get comparable results the same length as above must be maintained, viz. 84 cm. The lower end of the femur will therefore measure 35 cm. If the same relations existed in the two bones, the length of the portion of our femur below the lower end of the trochanter quartus would be $28 \times 35 : 49$ or 20 cm. The total length of our femur would then be at least 48 cm. Only one thing can follow from these different results for the length of our femur and that is, that our premise of the same relations in the two bones is wrong. The conclusion that the trochanter quartus of *Euskelesaurus Browni* lies relatively lower than the one of our form is right.

The sections through and near the pubic neck of *Euskelesaurus Browni* (**4**, p. 29) are quite different from those of our form. There are ridges on the lower surface of the neck, which are absent in our form. The shape of the proximal surface of the pubis is also different. The head of the tibia of *Euskelesaurus Browni* has a greater lateral concavity. There seems also to be great difference in the distal end, but the figures given by v. Huene are not quite clear. According to the text (**4**, p. 32) the posterior border of the distal end of the tibia in *Euskelesaurus Browni* is much longer than the anterior border. In our form this is just the reverse. v. Huene mentions that the type of tibia of *Euskelesaurus Browni* also occurs in *Gresslyosaurus robustus* of Bebenhausen near Tübingen. The distal end of the tibia of *Gresslyosaurus robustus* is figured and described on pp. 134 and 135 of v. HUENE's great work on European *Dinosaurs* (**5**). In the explanation of fig. 133 it is stated that the lower border of the figure corresponds with the anterior border of the distal end; this lower border, however, is much longer than the upper border, which would then correspond with the posterior border of the distal end. According to this figure, therefore, the anterior border of the distal end would be longer than the posterior border, as in all other Triassic *Theropoda.* Again, the explanation of fig. 134 states that the figure gives a postero-lateral view of the same distal end. From this figure it is apparent that the lateral end of the processus anterior is higher than that of the processus posterior and that both these processes correspond with the anterior and posterior border respectively of fig. 133. Now, if one compares the plate figure of this distal end on Pl. LIV, which is given in front view, with the text-figures, it will be found that the processus anterior is identical with the processus anterior of the text-figures, further that the processus posterior projects further downwards than the processus anterior and that the whole posterior breadth of the bone is hidden behind the anterior breadth. The three figures are therefore identical among themselves and they show the same build of the distal end of the tibia as in all other Triassic *Theropoda.* The description in the text, however, is quite different. It is stated, that the posterior medial angle of the distal end is acute and projects further to the medial side than the anterior angle; in the figure, however, the posterior medial angle is obtuse, while the anterior one is acute and projects further to the medial side. It is also stated in the text that the hinder convex border has a length of 15·5 cm. However, the convexity and the dimension correspond with the anterior border of the figures. As the figures correspond with the general build of the distal end of the tibia in *Theropodous Dinosaurs,* I can only conclude that some mistake must have entered into the description.

A comparison with *Gryponyx africanus* as described by BROOM (**7**) is very difficult. It is of the greatest importance to compare the proximal end of the pubis of our form with that of *Gryponyx,* especially with regard to the shape of the neck, but from the description it is quite impossible to do so, for Dr BROOM only states that "The upper end of the pubis is large and fairly flat," and "It has a large nearly round pubic foramen." Mr S. H. HAUGHTON of Cape Town, however, has very kindly furnished me with the necessary information. It appears that the pubic neck of *Gryponyx africanus* is very broad and flat, being nearly three times as broad as thick. Another very desirable comparison is that of the tibiae. The tibia of our form is typically *Plateosaurid.* This is especially shown by the shape of the head. Dr BROOM describes the tibia of *Gryponyx africanus* as follows: "The tibia has a larger head than appears to be the case in *Plateosaurus,* but otherwise presents no special interesting features. The total length of the bone is 447 mm. and the proximal end measures 163 mm. by 71 mm." That is all. Nothing about the shape of the proximal nor of the distal end. Only a few measurements to work with. It appears that our tibia is 1·3 cm. longer. Its head however is 3 cm. longer and 6 cm. broader. Therefore the tibia of our form has a very much larger head than that of *Gryponyx africanus.* A figure of the tibia of *Gryponyx africanus* has been given (**7**, Pl. XIV, fig. 4) and in the explanation this is called an "outer view of left tibia." In an outer view the sulcus malleoli should be visible. It is, however, not shown in the figure. It would be remarkable if this tibia did not possess such a sulcus. There is, however, no reason whatever to accept such a condition, for the figure is not an outer view of the left tibia, but an inner view of the right one. The following points will demonstrate this conclusion: A lateral view would not only show the sulcus malleoli but also the proximal articulation surface, because the latero-posterior corner is the lowest part of the head of the tibia in *Plateosauridae* and *Anchisauridae*. Neither of these two are visible in the figure. The border between the side figured and the distal surface is horizontal, as is the case with the medial border of the distal end of the tibia in all Triassic *Theropods*. In the figure the anterior border of the distal end passes from the anterior end of this horizontal border upwards and forwards (the anterior border of the proximal end is on the left-hand side). In an outer view of the left tibia, in which the anterior surface of the bone is visible, the anterior border of the distal surface would pass from the left end of the horizontal medial border upwards and backwards. An inner view of the left tibia and an outer view of the right one would have their anterior surface on the right-hand side. Dr BROOM does not give the distances of the trochanters from the proximal end of the femur. Taken from the figure, the upper end of the trochanter major lies at a distance of 10 cm., and the upper end of the trochanter quartus at a distance of 18 cm. from the proximal end of the bone. In our femur, therefore, the trochanter major is situated relatively lower than in *Gryponyx africanus*.

A comparison with *Plateosaurus stormbergensis* BROOM (**9**, p. 162) is practically impossible from the "description." Dr BROOM mentions three bones, the metacarpale, the femur and the pubis. Of the femur the length, the breadth of the distal end and the distance from the proximal end to the top of the median trochanter are given as principal measurements. Essentially the description of this bone consists of the statement that it agrees very closely with the femora of existing species of *Plateosaurus*. The existence of this close agreement is greatly appreciated, so much so, that one develops an irresistible wish to know exactly how this femur differs from those described before. However, to arrive at this knowledge, it is necessary to have among others another principal measurement, the distance of the trochanter major from the proximal end, which Dr BROOM does not give. I conclude, from the figure of the femur of *Plateosaurus stormbergensis* (**9**, p. 164), that the proximal end of the femur in our form is more massive than in the type from the Stormberg.

The head of the tibia of our form is relatively much broader than that of *Massospondylus Harriesi*.

A comparison of the tibia of our form with that of the European *Plateosauridae* shows that the tibial head of our form is relatively much bigger than that of *Plateosaurus Reinigeri* and that the relations of the head of the tibia in *Plateosaurus erlenbergiensis*, *Plateosaurus poligniensis*, *Gresslyosaurus robustus* and in *Pachysaurus ajax* are quite different from those in our form.

It follows from the above considerations that the present form is new and belongs to a new genus. I therefore propose to call it *Eucnemesaurus fortis* n.g. et sp. (*εὖ* = good, *κνήμη* = tibia, *σαῦρος* = lizard; *fortis* = strong).

Gryponyx transvaalensis BROOM.

Through the kindness of Dr BROOM the Transvaal Museum now possesses the type specimens of *Gryponyx transvaalensis*. These consist of a claw-phalanx and the distal end of a metatarsale. The claw has been described by Dr BROOM as belonging to the first digit of the right manus (**8**, p. 82, fig. 3). The clawphalanx is high and strongly curved. Its right side is somewhat weathered, but it is still plainly visible that the groove for the claw on the right side lies slightly deeper than that on the left. There is a broad ridge on each side below this groove. The highest part of this ridge on the right side lies so far below its middle line, that it forms a fairly sharp lower edge to the right side of the bone. The highest part of the ridge on the left side of the bone follows the middle line of the ridge. The ridge on the right side passes further backwards than that on the left. There is a broad, thick, boss in front of the middle of the articulation surface on the left side. That on the right side is broken away. This boss is separated from the ridge in front of it by a broad groove, which passes downwards and then backwards above the tuberositas for the flexor tendon; upwards the groove is continuous with the groove for the claw. The greater part of the tuberositas for the flexor tendon is broken away. The articulation surface has completely disappeared by weathering. If compared with the clawphalanx of the first finger of *Massospondylus Browni* described hereafter, it will be noticed that what is called here right and left corresponds with medial and lateral respectively there. This therefore means, that the claw is not of the right manus as stated in the original description, but of the left. I do not think that it belongs to the same species as *Massospondylus Browni*, because the proximal end of the lateral side ridge lies relatively much higher, with regard to that of the medial side, than the proximal end of the lateral side ridge in *Massospondylus Browni*. Whether it belongs to the genus *Gryponyx* I am unable to say at present. Dr BROOM mentions "the vascular groove" and one is led to believe that only one such groove is present. This, however, is not so, for although the medial side of the bone is weathered, one can still distinctly trace the groove on that side. In the description of *Gryponyx africanus* (**7**, p. 296) Dr BROOM states of the clawphalanx of the first finger: "On the radial side is a marked vascular groove." As the statement stands, one concludes that such a groove is not present on the "ulnar side." However, I very much doubt the truth of such a conclusion and until it is contradicted I will accept *Gryponyx africanus* to have a clawphalanx of the first finger with two grooves for the claw, as in all other Triassic *Theropoda*.

The distal end of the metatarsale has been described as that of the second bone of the right foot. The breadth of the distal end is 3·8 cm. and its thickness 2·4 cm. The medial end of the axis of the articulation surface is slightly higher than its lateral end. The middle of the posterior surface immediately above the articulation surface is concave. Laterally it is bordered by a ridge, which runs upwards from the lateral lower corner of the surface and practically parallel to the lateral side. The medial posterior process of the distal end is short and directed about just as much outwards as inwards. The anterior surface shows a slight thickening above the middle of the articulation surface, bounded above by a very shallow, half-moon shaped concavity. On the lateral border of the anterior surface this concavity is bounded by a broad low boss, which forms at the same time the upper anterior knob-like process of the border of the lateral collateral pit. This pit has an upper, a lower and an anterior outlet. The section at the fractured end is broad laterally and narrow medially. Some of the characters of the bone, as for example the ridge on the posterior surface and the section of the shaft, point to a second metatarsale, but others, as for example those of the anterior surface, point to a third metatarsale. At present I am unable to decide the point.

Dromicosaurus gracilis n.g. et sp.

The following remains were collected by myself from the Red Beds of

Nauwpoort Nek, Bethlehem District. The exact locality is about 100 yards above the road from Bethlehem to Clarens as it passes through Nauwpoort Nek and on its right-hand side coming from Bethlehem. The remains consist of fragments of humerus and radius, a fairly complete neck-vertebra, some caudal vertebrae, the pubes, the ischia, a femur, a tibia, a fibula and some foot-bones.

Neck Vertebrae.

One neck-vertebra is preserved. It belongs to the anterior region of the neck and may possibly be the third vertebra (Pl. XVI, fig. 3). A portion of the neural arch with the processus spinosus is broken off. Its left side is still partially covered by matrix. It is cracked in different places and a broad crack affecting the length is now filled with matrix. The length of the centrum as preserved is 7·6 cm. Height of its anterior articulation surface 4·7 cm. Height of its posterior articulation surface 5·1 cm. Breadth of the anterior and posterior articulation surfaces 4·6 cm. and 4·7 cm. respectively. The lower surface of the centrum is deeply concave, the deepest part of this concavity lying about 3 cm. behind the anterior surface; the height of the centrum is here about 3 cm. and its breadth about 2 cm. Both the articulation surfaces of the centrum are deeply concave. The left praezygapophysis projects far forwards and its articulation surface is perfectly horizontal.

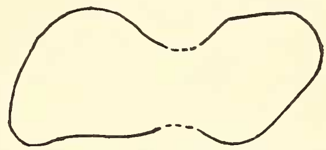
Caudal Vertebrae.

There are remains of some eight caudal vertebrae (Pl. XVI, fig. 1). They probably all belong to the anterior caudal region and are very badly preserved. The two biggest centra (Pl. XVI, fig. 1*a*) have a length of 5 cm. and a height of 6 cm. Their upper breadth is about 4·5 cm. The lower end of their distal articulation surface is strongly recurved for the articulation of the haemapophysis. The lower surface of the centrum is narrow and fairly flat; there may have been a very slight groove, but it is not visible now. The next following in size (Pl. XVI, fig. 1*b*) is only represented by the upper half of its centrum with its dorsal spine. One praezygapophysis is preserved. It is long and its articulation surface slopes inwards and downwards. The postzygapophyses are short and situated high up behind the dorsal spine. Their articulation surfaces have the same slope as of the praezygapophysis. The end of the dorsal spine is broken off; as preserved, its length is 5·5 cm. It is narrow and thick, breadth and thickness measuring 2 cm. and 1 cm. respectively, just above the postzygapophyses. The fourth and fifth vertebrae are slightly smaller than the third, but do not show any remarkable features. The other remains belong to three smaller vertebrae, the smallest of which has a length of 5·5 cm., while its articulation surfaces have a height of 3·8 cm. The lower ends of both articulation surfaces are strongly recurved. The lower side of the centrum is grooved (Pl. XVI, fig. 1*c*). The proximal end of a haemapophysis is preserved. The breadth of its upper end is 3·5 cm. and the length of its articulation surface is 2·7 cm. This must be one of the most anterior haemapophyses, for it fits exactly on to one of the large centra.

Humerus.

The distal end of the left humerus is preserved in a fragmentary condition, but the bone has apparently not suffered from pressure. The bone is broken off beneath the processus lateralis (Pl. XIV, fig. 6 and text-figs. 8 and 9). The lateral side of the shaft is also lost. The proximal plate must have made an angle of nearly 90° with the plane of the distal end. A narrow, high, rounded ridge runs from the extreme end of the condylus lateralis upwards to the lower end of the crista radialis. The broad ridge running upwards from the condylus medialis seems to reach the medial side of the processus lateralis. The anterior surface between these two ridges is strongly concave; in its distal part this concavity contains a circular depression. The anterior surface of the distal end is concave. The breadth of the distal end is 9 cm. Thickness medial condyle 3·9 cm., breadth 5 cm. Thickness lateral condyle 4·3 cm., breadth

Text-fig. 8. *Dromicosaurus gracilis.* Distal end of left humerus. Outline of medial view. $\times \frac{1}{2}$.



Text-fig. 9. *Dromicosaurus gracilis.* Distal end of left humerus. Outline of distal surface seen from below. Medial side to the left. Less than $\times \frac{1}{2}$.

2·9 cm. The articulation surface of the lateral condyle is divided into two facets, an outer, which is directed downwards and inwards, and an inner, which is directed downwards and outwards, meeting in a ridge, which runs through the middle of the distal surface of the condyle and parallel to its lateral side. The lateral condyle leans over to the lateral side and the medial surface of the medial condyle is also directed forwards and sidewards. The distal surface of the medial condyle is convex; its medial portion is weathered.

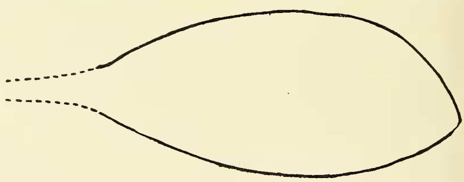
RADIUS.

The proximal end of the left radius is present (Pl. XIII, figs. 5 and 6). The length of the articulation surface is 4·7 cm. and its breadth is 2·7 cm. The surface is cylindrically concave, and the axis of this cylinder is directed from the anterior end of the antero-medial border to the posterior end of the postero-lateral border. The concavity is deepest at its anterior end, where it makes the deepest notch in the border. The posterior part of the antero-medial border and the anterior part of the postero-lateral border are both drawn upwards; the former is slightly higher than the latter. The edges of the articulation surface are broad and rounded.

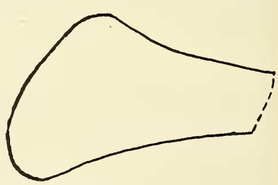
PUBIS.

When the fossil was discovered the pubes were still *in situ*, but all the covering matrix had completely weathered away. The proximal end of the right pubis was lost. The upper inner corner of the plate of the left pubis was present, but the portion which is bent downwards at this corner was absent. As preserved, the foramen obturatorium was therefore not completely closed. The anterior corner of the proximal end was weathered. The remainder of both bones, right up to their distal ends, was cracked, but otherwise perfect. The distal two-thirds of the bones showed a remarkable feature. The two plate-like portions of the pubes were coalesced along the middle and formed only one bone. No division between the two pubic plates could be found. Through the cracks it was apparent that the pubic plate was very thin along its middle line. During excavation everything was done to keep the pubes intact, and they were even got out on a lump of rock, which was placed in a box. While I was busy with the excavation of the further remains, somebody else was kind enough to meddle with the transport of this valuable specimen. It was placed on the head of a Kaffir-boy who took it down hill and overturned the box into a wheelbarrow before it could be prevented.

After the pieces had been fitted together as far as possible the two pubes appeared as figured on Pl. XVI, figs. 4 and 5. The length of the most complete of the two, the left pubis, cannot be accurately given, for the distal end cannot be fitted on to the remainder. The length of the bone as preserved, without the distal end, is 34 cm. Then comes a gap, which may have a length of 5 mm. medially and of about 2·5 cm. laterally. The distal end has a medial length of 6·5 cm. and a lateral length of 8 cm. The total length of the bone may therefore have been 42 cm. It is very improbable that the length of the gap was greater, for I am under the impression that the two pieces of bone were separated medially by a crack filled up with matrix. Laterally of course a piece of bone has been lost. The distal ends of both pubes show their complete breadth. If they are placed alongside of each other the maximum breadth of the pubic plate of the combined bones at the distal end would be 16·5 cm. The breadth of the plate would have been less in the middle, because the distal ends have lateral projections. The pubic plate is thickest near its lateral side. The lateral border is fairly sharp, but the bone thickens rapidly from this border inwards. It attains its maximum thickness before the middle of the bone is reached and it then thins out gradually towards the medial line, where the extremely thin bone was coalesced with its fellow (text-fig. 10). The maximum thickness of the left half of the pubic plate above its middle is 2·5 cm. Near its distal end the thickness is less than 2 cm. A piece of the present medial edge of the bone has a thickness of 3 mm. The distal end is very much thickened, that is to say, the hinder surface of the distal end bulges considerably backwards. The anterior surface of this end is slightly concave, through a slight thickening of the distal border. The lateral side bends slightly outwards at the distal end. The distal surface is very broad, because of the thick end (text-figs. 11 and 12). The hinder surface is concave from above downwards immediately above the distal surface. The maximum thickness of the distal end which lies midway between the sides is 3·5 cm. The maximum breadth of the distal surface is nearly 5 cm. The distal surface is convex and its lateral-hinder-medial border is half a circle. The anterior border is straight.



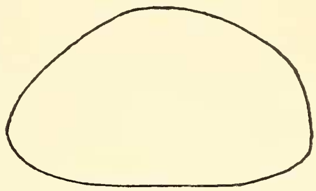
Text-fig. 10. *Dromicosaurus gracilis.* Outline of section through middle portion of left pubis seen from the distal end. Nat. size.



Text-fig. 11. *Dromicosaurus gracilis.* Outline of longitudinal section through distal end of left pubis. The anterior border is below. × ½.

This half circle and the front border lie in a plane which makes an acute angle with the anterior surface of the pubic plate.

Nothing is present of the bent-down portion at the inner proximal corner of the pubic plate. A broken edge indicates how far this bent-down portion continued towards the proximal end. From here the pubic neck continues towards the articulatio ileo-pubica. The section of the neck is triangular as shown in text-fig. 2. The lateral border of the neck is a continuation of the lateral border of the plate, it is only slightly concave forwards. The hinder-outer surface of the neck is slightly convex. The neck has an anterior surface and an inner surface, which stand at right angles to each other. The anterior surface rounds off broadly into the inner surface. Both surfaces are concave from above downwards. The distance between the lateral border and the inner posterior border of the neck is 4 cm. The upper anterior corner of the bone and the articulatio ileo-pubica are weathered away. The thickness of the head at the upper anterior end is about 5 cm. The processus subacetabularis is not only bent downwards at right angles to the neck, but its general direction is also practically perpendicular to the pubic plate. The medial border of its upper surface is fairly straight. The proximal portion of this upper surface has a high boss on its lateral border. The distal portion shows a deep concavity, which does not affect the medial border, but which continues over the lateral border. The medial surface of the processus is concave in all directions and strongly so from above downwards. Its general section is triangular. The length of the processus is about 7·5 cm. The breadth of its upper surface is less than 4·5 cm. The distal end of the processus subacetabularis is flat and has a process which is directed downwards, forwards and inwards. This process stands practically at right angles to the processus subacetabularis. Distally it turns more and more inwards; its section is triangular. The lower end of the hinder surface of this process is damaged. The upper border of the triangular articulatio ischio-pubica, which is covered with small knobs and pits, has a breadth of about 4·5 cm. Its height as far as preserved is about the same. The breadth of the foramen obturatorium is 17 mm. Its length was more than 3 cm.

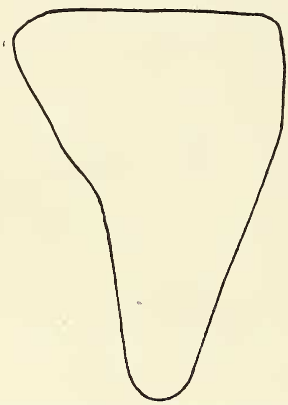


Text-fig. 12. *Dromicosaurus gracilis.* Outline of distal surface of pubis seen from distal end. $\times \frac{1}{2}$.

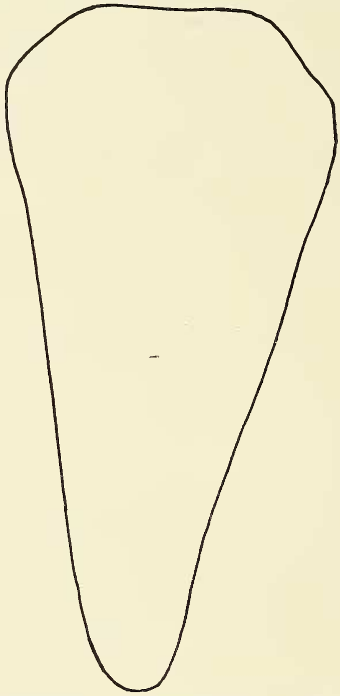
ISCHIUM.

Both ischia are present, but they are very much broken. The left ischium is fairly complete, but it is broken in two and the parts are joined by a thick band of matrix. The thin upper anterior portion is badly broken and the extreme distal end is lost. The distal end of the right ischium is complete, but its proximal end is lost (Pl. XV, fig. 4).

If the bones are combined, it will be found that the length of the ischium is 34 cm. The distal portion is straight and the proximal plate is turned slightly outwards. The breadth of the proximal plate with the processus subacetabularis (Pl. XV, fig. 6) is 11 cm. A small piece of the posterior portion of the proximal end is broken off and the bone has suffered somewhat from pressure. The original total breadth may therefore have been 12 cm. The posterior portion of the proximal surface has a breadth of 6·5 cm. as preserved. However, from this must be deducted 1 cm. for a seam of matrix, which passes in a sagittal direction through the posterior portion of the upper end of the bone. The original breadth was, therefore, 5·5 cm. The surface is covered with numerous small knobs and pits. The outer border of this portion is formed by a long posterior and a short anterior sharp edge, which stand nearly at right angles to each other. The vertex of this angle is high and projects to the lateral side. The medial border of this surface passes upwards and forwards and, after reaching a point opposite the angle on the lateral border, downwards and forwards. There is a high boss on the proximal surface at the angle between these two medial borders. The medial and lateral angles of the border lie exactly opposite each other. The surface posterior to these two angles serves for articulation with the processus postacetabularis ilei. In



Text-fig. 13. *Dromicosaurus gracilis.* Left ischium. Outline of the articulatio ischio-pubica seen from in front. Nat. size.



Text-fig. 14. *Dromicosaurus gracilis.* Right ischium. Outline of distal surface seen from the distal end. The medial border to the left. Nat. size.

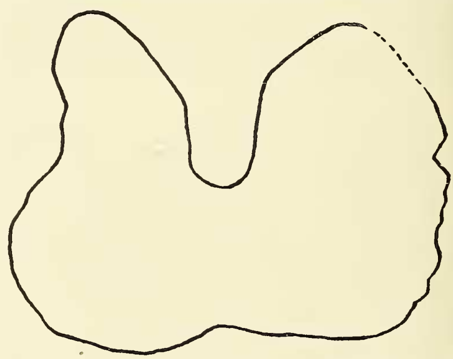
front of the medial boss is a small triangular surface, which is bordered in front by a ridge; this ridge is a continuation of the anterior part of the lateral border and runs obliquely across the proximal surface, meeting the medial border further downwards than its starting point. Distally to this ridge is the processus subacetabularis ischii. The medial border of this processus is extremely thin and slightly concave upwards. The upper surface of the processus is concave. The edge with the lateral surface is rounded. The lateral surface of the processus is convex from above downwards. The medial surface of the whole proximal end is strongly concave from above downwards. The distal end of the upper surface of the processus makes an acute angle with the articulation surface for the pubis. The articulatio ischio-pubica has a triangular shape (text-fig. 13) and the surface is covered with small knobs and pits. Its upper border has a length of 3·5 cm.; the height of the triangle is about 5 cm. The articulatio pubica makes an angle of about 60° with the articulatio iliaca and an angle of about 40° with the general long axis of the ischium. The articulatio iliaca makes an angle of less than 25° with the general long axis of the bone. The thin anterior portion of the plate is damaged and its edge is broken off. Probably this edge was fairly straight or slightly convex between the lower end of the processus subacetabularis and the place where the proximal and the distal portions of the ischium form a curve. The thin anterior portion terminates at a distance of about 12 cm. below the proximal end. The posterior portion of the plate is thicker than the anterior portion. A few centimetres below the articulation surface its thickness is 18 mm. A broad groove starts at a short distance (1·5 cm.) below the articulation surface on the posterior edge of the lateral side. Through the twisting of the distal portion of the bone the groove soon passes on to its hinder surface. It cannot be made out how far this groove runs downwards. The distal end of the ischium has a flat hinder surface. Its section is triangular (text-fig. 14). The medial sides of the two distal ends lie against each other and although they are proximally separated by matrix, the two bones seem to be coalesced distally. The specimen is slightly pressed sideways, but probably the two hinder surfaces lie in a plane. The two lateral surfaces meet in a ridge. The distal end is thickened. The border of the distal surface projects posteriorly, laterally and anteriorly (Pl. XV, fig. 5). The distal surface is probably convex. The breadth of the hinder surface near the middle is 3·5 cm. and the thickness at the same spot 3 cm. The greatest breadth of the distal end of the right ischium is more than 4 cm. Its thickness is nearly 9 cm.

FEMUR.

The left femur is preserved (Pl. XIII, figs. 2—4, and text-fig. 15), but in a rather weathered condition. The caput femoris is broken off and in its lower half the femur was badly broken in two places. The pieces were fitted together by myself and joined with plaster of Paris. The length of the bone has not been influenced by these joints. It would not be exact to call the curvature of the diaphysis sigmoidal. Its middle portion is certainly convex forwards, but its upper end is not concave forwards as is usual, only less convex than the middle portion.

The length of the bone is 49·5 cm. The breadth of the proximal end cannot, of course, be given. The preserved portion of the proximal end rounds off into the lateral side; from opposite the upper end of the trochanter major the lateral side bends more and more inwards till near the proximal end, where the convexity becomes greater to pass over into the proximal surface. The trochanter minor was on the piece which is broken off and lost. The trochanter major is broken off. The upper end of the broken surface is situated at a distance of 7·5 cm. from the proximal end of the bone, and the lower end of the trochanter at a distance of 13·5 cm. from the same end. Between the lateral side of the preserved portion of the trochanter and the general surface of the bone there is a broad groove. The femur is broad and thin between its proximal end and the trochanter major; further downwards it becomes thicker. A broad ridge starts at the fractured edge of the proximal end, and coming from the direction of the caput femoris runs towards the trochanter major. In passing the trochanter it turns in the direction of the condylus medialis. The highest point of this ridge lies immediately below the trochanter major; its height diminishes towards the proximal end and towards the distal end, in the latter case to such an extent that it loses itself on the medial side below three-fifths of the length of the bone. The trochanter major does not lie on the top of the ridge, but is situated on its lateral side. Immediately below and medial to the lower end of the trochanter major the top of the ridge shows a broad, flat, rough surface. Lower down the top of the ridge is rounded and rough, the roughness narrowing down towards the middle of the bone, where it disappears. The surface of the bone enclosed between the medial side and the ridge, as far down as the upper end of the trochanter quartus, is concave. The lateral side of the anterior surface of the bone, below the lower end of the trochanter major and exactly opposite the whole length of the trochanter quartus, is slightly concave. A large oval foramen nutritivum, length 8 mm., breadth 4 mm., is situated on the lateral side of the top of the ridge and still within the rough surface, at a distance of 11 cm. from the upper end of the trochanter major. The medial side of the proximal end is hollow. This concavity, with the curve in the ridge and the convexity of the lateral side, marks the inward bend of the proximal end of the femur. The hinder surface of the proximal end is flat. Opposite the upper end of the trochanter quartus it rounds off over the lateral side of the bone into the anterior surface. Higher up, however, from opposite the middle of the trochanter major up to the proximal end of the lateral side, it rounds off into an elongated, flattish, lateral surface. This lateral surface is separated from the anterior surface by a heightened narrow ridge.

The trochanter quartus begins at a distance of about 14·5 cm. from the proximal end of the bone. It terminates at a distance of about 21·5 cm. from that end. The height of the trochanter, as preserved, is 3 cm. Its upper edge is broken off and at the most it could have been 0·5 cm. higher. The medial side of the trochanter is overhanging; the lower end of the lateral side is steep, but the slope of its upper end is much less. These two portions of the lateral side meet in a clearly visible rounded ridge, which runs in the direction of the upper outer corner of the proximal end and seems to continue further upwards than the much higher medial ridge of the trochanter. The whole trochanter is situated nearer to the medial than to the lateral side of the bone; moreover, the upper end lies nearer to the medial side than the lower end and therefore the edge of the trochanter lies in the direction of the condylus lateralis. Medially to the trochanter quartus there is a large, flat, rough surface, which has apparently served for the attachment of muscles. It looks mostly inwards and only slightly backwards. A ridge starts at the upper end of this surface, and runs from the lateral side on to the posterior surface in the direction of the lateral corner of the proximal end, passing well above the upper end of the trochanter quartus, where it terminates. The breadth of the diaphysis over the trochanter quartus is 6·5 cm. Its thickness, measured from the top of the lower end of the trochanter to the top of the ridge on the anterior surface, just above the foramen nutritivum, is 8·5 cm. At about 18 cm. above the distal end these dimensions are 7·5 cm. and 3·5 cm. respectively. The thickness of the distal end, measured from the anterior



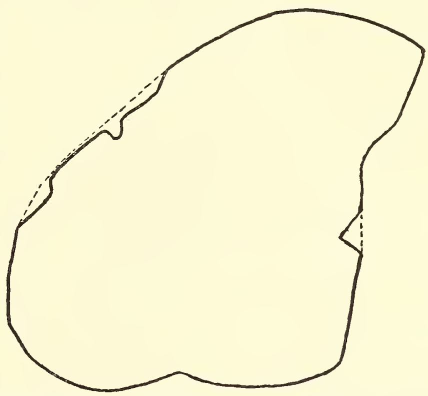
Text-fig. 15. *Dromicosaurus gracilis.* Left femur. Outline of distal end seen from below. Medial side to the right. $\times \frac{1}{2}$.

surface to the lower end of the fossa intercondyloidea, is 3·5 cm. Its thickness over the condylus medialis is 8·1 cm. and over the condylus lateralis 9 cm.

The upper end of the fossa intercondyloidea is damaged. It starts at least 12 cm. above the distal end. The condylus medialis is damaged; its breadth as preserved is 5 cm. Its height is about 6·5 cm. The condylus lateralis is much narrower; its breadth is 3·3 cm. The breadth of the distal end (text-fig. 15) is about 11·5 cm. The distal articulation surface is full of cracks and could not be well cleaned of matrix. The lateral side of the distal end is hollow and the hinder end of the condylus lateralis stands out slightly to the lateral side. The anterior surface of the distal end is hollow along its middle. Seen from the front it seems as if the lateral side of the bone runs slightly further downwards than the medial side. The diaphysis is hollow. The bone only forms a thin shell round a very large cavity.

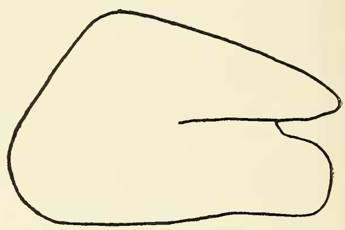
TIBIA.

Only the right tibia is preserved and that in perfect condition. It has a large proximal articulation surface and a straight shaft (Pl. XIV, figs. 1—3, and text-figs. 16 and 17). During its excavation, the bone of the diaphysis parted in small fragments from the filling of its cavity; however, all the pieces were fitted and glued together on the spot. The total length of the bone is 37·5 cm. The head of the tibia (text-fig. 16) has a length of 13 cm., measured from the hinder end of the medial condylus to the edge of the anterior crest. Its greatest breadth, transverse to this greatest length, is 8·5 cm. The length of the lateral side of the head is 9 cm. Anteriorly the head of the tibia has a laterally directed process, the tuberositas tibiae. The lateral border of the proximal articulation surface is directed straight backwards from the tuberositas tibiae, but before reaching the lateral condylus it becomes slightly concave; the remainder of this border is convex. The medial border runs from the tuberositas tibiae inwards and curves slightly backwards until at about 3·5 cm. from the anterior end the convexity becomes greater. It diminishes again at about 5 cm. from the anterior end; from this point further backwards the medial border is only slightly curved, but the convexity is greater around the condylus medialis. The posterior border is slightly convex behind each condylus and notched in the middle. The proximal articulation surface shows a large shallow concavity above the medial condylus; another large concavity is situated on the anterior end, while the upper surface of the lateral condylus is convex. The lateral posterior side of the surface is slightly lower than the medial posterior side. From the hinder border the articulation surface goes steeply upwards and forwards. The hinder border is overhanging; it rounds off abruptly into the lateral border; its medial end is slightly damaged. The shaft narrows down quickly immediately below the head.



Text-fig. 16. *Dromicosaurus gracilis*. Right tibia. Outline of proximal surface seen from above. Lateral side to the right. $\times \frac{1}{2}$.

The distal end is transversely broad. The medial one-third of the distal articulation surface is flat and slopes slightly from its anterior edge backwards and downwards. The lateral part of the distal articulation surface consists of an anterior and a posterior portion (text-fig. 17). The anterior portion, which is the distal surface of the processus tibiae anterior distalis, occupies a much higher position than the posterior portion, which is the distal surface of the processus tibiae posterior distalis. The distal surface of the processus posterior is continuous with the medial portion of the articulation surface. It slopes upwards from the lateral to the medial side and from the posterior towards the anterior border. The medial portion of the articulation surface is connected with the distal surface of the processus anterior by means of a short and very steep surface. The distal face of the processus anterior slopes from its medial end upwards and outwards, and from its anterior border backwards and slightly upwards. Medially the processus posterior is nearly as broad as the processus anterior. Towards the lateral side it becomes narrower and it terminates in a point. This end is bent very slightly forwards. Both ends of the distal surface of the processus anterior are broad, but the inner end is slightly broader. Apparently, the lateral end of the processus anterior does not project further outwards than the processus posterior. The highest point of the lower surface of the processus anterior is situated 37 mm. above the lowest part of the processus posterior. There is a slightly concave surface (sulcus malleoli tibiae) immediately behind the lateral end of the processus anterior. This surface passes downwards between the processi and is continuous with the concave upper anterior surface of the processus posterior; it passes inwards for a short distance only. The breadth of the distal end, along the front border of the articulation surface, is 82 mm. This front border is laterally slightly concave and medially, where a small piece of the edge is broken off, it is slightly convex. The medial border makes an acute angle with the anterior border and an obtuse angle with the posterior border. The borders round off into each other. The breadth of the medial side, measured parallel to the medial border, is 56 mm. The posterior border converges slightly with the anterior border towards the lateral side; its length is 60 mm. The distance from the anterior medial corner of the distal end to the lateral end of the processus posterior is 1 mm. longer than to that of the processus anterior.



Text-fig. 17. *Dromicosaurus gracilis.* Right tibia. Outline of distal surface seen from the distal end. Anterior border below. Lateral side to the right. $\times \frac{1}{2}$.

A broad high ridge runs down from the tuberositas tibiae in the direction of the anterior medial corner of the distal end. It does not reach this corner, however, for it terminates at about 6 cm. above the distal end. The surface between the lower end of this ridge and the distal end of the bone is concave. The lateral anterior edge of the distal end is broadly rounded below. Higher up the edge becomes a fairly sharp ridge; then again the ridge becomes broad and low and finally disappears above the middle of the bone. There is a broad, oval and very low boss on the lateral side of the bone, below the notch in the lateral border of the proximal surface; its upper end lies about 4 cm. below the notch and its lower end about 8 cm. Its breadth is about 2·5 cm. The thickness of the bone in the middle is 5·5 cm. and its breadth at this place about 4 cm. The thickness of the distal end is about 5 cm.

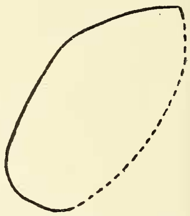
FIBULA.

Of the fibulae only the right bone has been found and this is in excellent condition. It has a length of 34·5 cm. v. HUENE has already pointed out that one can readily ascertain whether the fibula belongs to the left or to the right side. The lateral side of the proximal end is convex. The thin and low portion of the proximal end is anterior, the thick portion posterior.

In the following description the bone is so placed that the inner border of the posterior portion of the proximal articulation surface is directed straight backwards (Pl. XV, figs. 1—3). The proximal articulation surface is convex from side to side and its anterior portion is bent inwards (text-fig. 18). The whole surface is covered with irregular grooves and ridges. The anterior portion of the proximal end of the bone is strongly directed inwards; it is really a high, thin, anterior process. Its most anterior point lies far below the articulation surface. The lateral surface of the posterior portion of the proximal end is evenly convex. That of the anterior portion is slightly concave. Between these two portions the lateral surface is strongly convex. The posterior portion of the medial surface is flat; its anterior portion is slightly concave. There is a broad low boss slightly below the middle of the inner surface of the proximal end. From the posterior corner of the proximal end a broad ridge passes downwards and inwards for a short distance; it narrows down quickly and ends opposite the middle of the broad boss on the inner surface. The greatest breadth of the proximal end is 7·7 cm. Its greatest thickness is 2·8 cm. The thickness of the bone over the broad boss is 3 cm. The shaft narrows down rapidly immediately below the head. At a distance of 9 cm. from the proximal end the breadth of the bone has diminished to 3·5 cm. and the thickness to 2·1 cm. At a distance of 15 cm. from the proximal end the breadth of the bone is reduced to 3 cm., but the thickness has increased and is at this spot 3 cm. The greatest horizontal dimension of the shaft at this distance from the proximal end is 3·4 cm. This is due to a broad, high ridge on the lateral surface of the bone. This ridge starts very gradually at a distance of about 9·5 cm. from the proximal end on the anterior border of the lateral side of the bone. It ends at about 19 cm. from the proximal end. The distal end of the ridge is situated in the middle of the lateral surface of the shaft. The posterior side of the ridge is slightly concave at its upper end, but at its lower end it passes gradually into the posterior surface of the bone. The anterior side of the ridge is slightly concave. The anterior edge of the bone passes down as a low ridge along the medial side of this concave surface. There is a large oval depression on the anterior surface of the bone, medial to the low ridge just mentioned and looking slightly inwards. The medial side of this depression is slightly elevated above the medial surface. The upper and lower ends of the depression lie at a distance of 12 cm. and 15 cm. respectively from the proximal end. Slightly below the oval depression the low ridge subsides into the general surface of the bone. At a short distance from the depression the anterior edge again assumes a ridgy appearance. This ridge, however, is not a continuation of the preceding ridge, for the lower end of the latter lies higher than and lateral to the upper end of the former. This ridge runs downwards for a short distance and then also subsides into the general surface of the bone. A foramen nutritivum of about 6 mm. length

Text-fig. 18. *Dromicosaurus gracilis.* Right fibula. Outline of proximal end seen from above. Medial side to the left. × ½.

and 2 mm. breadth is situated on the medial surface, at a short distance below the oval depression. The hinder surface of the bone is narrow and rounded. The edge between the hinder surface and the medial surface is rounded in its upper two-thirds. At the upper end of its lower third it forms a short, sharp and low ridge, the lower end of which lies 10 cm. above the distal articulation surface. From this ridge two diverging ridges run towards the distal end. The posterior one is low, broad and rounded at its upper end; at its lower end it is a high and broad ridge, the edge of which, however, is broken off. As the medial-posterior side of the distal end is weathered, one cannot be sure whether this ridge reached the border of the articulation surface; there are indications that it did not. The anterior ridge is also low, broad and rounded at its upper end, but its lower end is high and narrow, this being the result of the medial and anterior surfaces meeting at an acute angle. This ridge runs right down to the antero-medial corner of the distal end. The medial surface between the two ridges is concave. The posterior and anterior surfaces of the distal end are narrow and slightly convex in horizontal section. In a vertical direction they are concave, especially the anterior surface. The lateral surface of the distal end is narrow and very convex in horizontal section; it is slightly concave from above downwards. The distal articulation surface (text-fig. 19) has somewhat the shape of an oval. Its long axis makes an angle of slightly more than 45° with the sagittal line. Its anterior end lies medially and its posterior end laterally. The articulation surface is covered with irregularities but is generally flattish. It slopes from the antero-medial end downwards to the postero-lateral end. The difference in height of the two corners is about 16 mm. The postero-medial border is weathered, but was probably an evenly convex line from the antero-medial end to the postero-lateral end. The border of the postero-lateral end is broadly rounded, that of the antero-medial end bluntly pointed. There is a short, straight anterior border running from the antero-medial end outwards till past the middle of the distal end. The front border is connected by another straight border with the postero-lateral end. The distance from the antero-medial corner to the postero-lateral corner is 6·2 cm. The breadth of the distal end as preserved is 3·3 cm. The diaphysis is bent and concave medially. At a distance of 20 cm. from the proximal end the breadth of the shaft (transverse dimension) is 2·5 cm. and the thickness 2·6 cm.



Text-fig. 19. *Dromicosaurus gracilis.* Right fibula. Outline of distal end seen from below. Anterior border above. Medial side to the right. $\times \frac{1}{2}$.

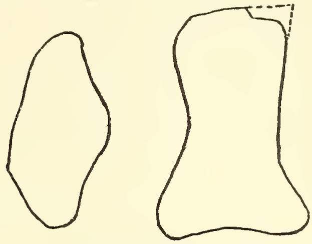
Foot.

The foot is represented by some well-preserved fragments.

Metatarsale I is represented by two pieces, one of which is the proximal end of the right bone (text-fig. 20). Its breadth is 5 cm. and its thickness 2·4 cm. The length of the piece is 5·5 cm. There is a narrow ridge in front which passes into the rounded anterior surface of the shaft before reaching the end of the piece. A broad ridge runs downwards from the middle of the lateral border of the proximal articulation surface; it reaches the anterior border of the shaft at the fractured end. Posteriorly the bone has a broad rough edge. Further downwards this edge is smooth and passes into the rounded posterior surface of the shaft. There is a slight angle between the rough and the smooth surface. The medial surface bends to the lateral side near the posterior border. The proximal surface is hollow in the middle;

this cavity passes forwards and outwards and over the anterior lateral border.

The other piece is a fragment of the distal end of the right bone (Pl. XIII, fig. 8). The globose part of the articulation surface has a thickness of 2·7 cm. The lateral collateral pit has a tremendous size. It has a length of 2 cm. and a breadth of 1·2 cm. Its upper anterior and lower posterior ends are open. The cavity has a more or less cylindrical shape. That this piece must belong to the right bone is shown by the fact that its latero-posterior surface is concave close to the medial fracture, which concavity is a portion of the large concavity on the latero-posterior surface, well-known from other first phalanges. The antero-medial surface of the bone is separated by a ridge from the articulation surface.

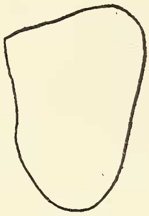


Text-fig. 20. *Dromicosaurus gracilis*. Metatarsale I and II of the right side. Outline of proximal end of the bones, seen from the proximal side. $\times \frac{1}{2}$.

Metatarsale II is only represented by the proximal end of the right bone (text-fig. 20). The proximal articulation surface has the shape of a quadrangle. All four sides of this quadrangle are concave. The medial side is deepest in the middle, while the deepest place of the lateral side lies nearer to the hinder border. The lengths of the different borders of the proximal surface are: medial 5·7 cm., lateral approximately 6 cm., posterior 4·1 cm. and anterior approximately 3 cm. Ridges run from the corners of the proximal surface downwards on to the shaft. The upper end of the antero-lateral ridge is weathered away, but very probably it was sharp. The antero-medial ridge is rounded. The base of the postero-medial ridge is broader than that of the postero-lateral one. The proximal surface of this last ridge is slightly lower than that of the former one. The postero-lateral ridge stands further out from the bone than the postero-medial one. The anterior border of the proximal surface overhangs the anterior surface of the bone. The length of the piece is 4 cm.

Metatarsale III. There is one piece which, I take it, belongs here, viz. the distal end of the right bone. Its medial side is missing (Pl. XIV, fig. 4). The lateral side has a thickness of 2·4 cm. The lateral collateral pit is very deep. Its hinder edge has a small process behind the middle of the pit and its anterior edge has two knob-like processes with a groove in between. The upper knob-like process is separated from the process on the hinder edge by a deep groove. A rounded ridge passes on the anterior surface inwards and slightly upwards from the upper knob-like process. The anterior surface is slightly concave between this ridge and the articulation surface. I am not quite certain of the identification of this bone.

The last bone of this collection is also difficult to identify. It is probably the proximal end of the left ulna and although there is no certainty on this point I will here describe it as such. The length of the piece (Pl. XIV, fig. 5) is nearly 8 cm. Its antero-medial side is weathered. As preserved, the length of the lateral border of the proximal surface (text-fig. 21) is 3·6 cm. The length of its posterior border is 5 cm. The length of its antero-medial border was greater than 5·6 cm. The proximal surface is divided into two portions by a high ridge, which passes over the surface from the middle of the posterior to the middle of the antero-medial side. The portion of the proximal surface which lies medial and posterior to this ridge is convex and slopes down towards the postero-medial corner of the surface. The portion of the proximal surface which lies lateral and anterior to the ridge slopes more strongly forwards and is concave medially. The posterior border of the surface is concave laterally and convex medially. The lateral border overhangs the lateral surface of the shaft. The antero-medial corner is slightly lower than the postero-lateral one.



Text-fig. 21. *Dromicosaurus gracilis.* Outline of the proximal end of the left ulna (?), seen from the proximal side. Posterior side to the left and lateral side above. $\times \frac{1}{2}$.

If this is actually the proximal end of the left ulna, then a large portion of the antero-medial angle of the head has worn away.

Discussion.

It will not be necessary to compare with the Plateosaurid *Eucnemesaurus*, for the present form is plainly an *Anchisaurid.*

The trochanter quartus of our form lies relatively much deeper than that of *Plateosaurus stormbergensis.*

A comparison with *Massospondylus carinatus* is difficult, because most of the type remains are fragments. The head of the pubis shows some important differences. In the first place the length of the head of the pubis of *Massospondylus carinatus* as figured by v. Huene (**4**, p. 38, fig. 51), and measured from the articulatio ischio-pubica straight across to the anterior surface, is 9·6 cm. In our form the upper anterior portion of the head is damaged. As preserved, the length of head and processus subacetabularis together is 7·1 cm. In the above the total length of the undamaged head was estimated at 7·5 cm. It can certainly not have been more than 8 cm. It appears, therefore, that the pubic head of *Massospondylus carinatus* is longer than that of our form. It is, however, apparent from the femur that our form is a bigger animal than the type of *Massospondylus carinatus.* The pubic head is, therefore, relatively much longer than that of our form. The thickness of the head is about half that of our form. The section of the neck of the pubis, which has the shape of a very elongated oval with pointed ends, differs considerably from that of the present form.

The coalesced portion of the ischia shows different sections to that of the form just described. Sections of the coalesced portion in our form are triangular everywhere, they do not even approach the rounded form of the distal end of the *Massospondylus* fragment.

The length of the femur of *Massospondylus carinatus* is estimated at 43 cm. The length of the lower portion below the trochanter quartus is about 22 cm. In our form these lengths are 49·5 cm. and 28 cm. Our femur, therefore, is longer. In the femur of *Massospondylus carinatus*, however, the trochanter major lies 9 cm. below the proximal end, while in our form this distance is only 7·5 cm. The breadth of our femur above the trochanter major is 7·5 cm. and its thickness there is 3·6 cm. (the bone is not crushed). In *Massospondylus carinatus* these dimensions are 7 cm. and 4·4 cm. respectively. These dimensions show, therefore, different relations in the two bones.

The tibia of *Massospondylus carinatus* is not complete. However, the proximal and distal ends are preserved. v. Huene gives the following measurements of the head: length of the medial side 11 cm., of the lateral side 9·5 cm. and greatest breadth 7·5 cm. (**4**, p. 42). These dimensions in our form are 13 cm., 9 cm. and 8·5 cm. respectively. From these measurements it will be clear that the relations of the two bones are different. In *Massospondylus carinatus* the distal end of the tibia has the following dimensions: length anterior border 6 cm., medial border 4·5 cm., posterior border less than 4 cm. and lateral border 4 cm. In our form these dimensions are respectively 8·2 cm., 5·6 cm., 6 cm. and 4·2 cm. In *Massospondylus carinatus* the medial border of the distal end is longer than the posterior border, in our form it is the reverse. The above-mentioned differences may be regarded as sufficient to exclude our form from the genus *Massospondylus*.

Massospondylus Harriesi is very much smaller than our form. The distal end of its femur, measured from the lower end of the trochanter quartus, is 15·5 cm. In our form this portion measures 28 cm. The proximal end of the tibia of *Massospondylus Harriesi* measures 10·2 cm. × 5·2 cm. If the same relations existed in our form as in *Massospondylus Harriesi* the tibial head of the last should have a length of 13 × 15·5 : 28 = 7·2 cm. The head of the tibia of *Massospondylus Harriesi* is therefore much longer than in our form. Length and breadth of the head of the tibia in our form are 13 cm. and 8·5 cm. respectively. If the same relations existed, the breadth of the head of the tibia in *Massospondylus Harriesi*, with regard to its length, should be 8·5 × 10·2 : 13 = 6·67 cm. Therefore, the head of the tibia in *Massospondylus Harriesi* is relatively narrower than in our form.

A comparison with *Aetonyx palustris* is difficult, because what is present in the one is missing in the other (**7**, p. 304). In *Aetonyx palustris* the width of the lower end of the humerus is 5·7 cm. In our form it is 9 cm. The length of the humerus in *Aetonyx* is 17·4 cm. If the same relations exist in our form, the length of our humerus should be 17·4 × 9 : 5·7 = 27·5 cm. In *Aetonyx palustris* the lower end of the delto-pectoral ridge lies 10·1 cm. from the upper end of the bone. This measurement and the length of the bone have been verified in the figure and were found to be correct. The distance of the lower end of the delto-pectoral ridge from the distal end of the bone, measured in the figure, is 9·2 cm. This may be slightly more in reality through foreshortening, and also because of the damaged condyle. With the same relations the lower end of the delto-pectoral ridge in our form should lie at a distance of 9 × 9·2 : 5·7 = 14·4 cm. from the distal end. With regard to the curvature at the upper end of our fragment and after comparison with other humeri, I come to the conclusion that it must lie at a distance of, at the very most, 13 cm. from the distal end. However, with a slightly longer upper end the total length of the bone would then come near the result obtained above. In *Aetonyx palustris* the proximal width of the second metatarsale is 2·5 cm. and that of the third metatarsale 2·6 cm. It could not be made out whether Dr BROOM means the greatest dimension of the proximal ends or the breadth along one of the borders of the bones. From the description of *Massospondylus Harriesi*, however, I conclude that the greatest dimension is meant. In our form the greatest dimension of these two ends is 6·7 cm. and 5·6 cm. respectively. The greatest breadth of our metatarsale II is 4·1 cm. and of metatarsale III 3·6 cm. In both cases, therefore, the proximal end of our metatarsale II is larger than that of metatarsale III, whereas in *Aetonyx palustris* the proximal end of metatarsale III is only slightly wider than that of metatarsale II.

The head of the tibia is relatively shorter in *Thecodontosaurus skirtopodus* than in our form (**4**, p. 44). The femora of *Thecodontosaurus Browni* (**2**, p. 124

and 4, p. 46) are much more curved than in our form. In *Thecodontosaurus Browni* the femur has a length of 24 cm. and the lower end of the trochanter quartus lies 11 cm. below the proximal end. In our form these measurements are 49·5 cm. and 21·5 cm. respectively, and it easily follows that the trochanter quartus lies relatively higher in our form than in *Thecodontosaurus Browni*. The trochanter major lies also relatively higher in our form.

Although our tibia is shorter than that of *Gryponyx africanus*, its head is absolutely broader. The relations of the head of the tibia in *Gryponyx africanus* are altogether different from those in our form. The shape of pubis and ischium is also quite different.

A comparison of the ischium of the present form with the well-preserved one of *Teratosaurus suevicus* H. v. MEYER (5) shows that, where the last is twice as long as broad, the ischium of our form is more than three times as long as broad. Casually connected with this greater relative breadth is the fact that the articulation surfaces of the ischium of *Teratosaurus suevicus* make much greater angles with each other and with the shaft of the bone than in our form. In the present form the articulatio iliaca makes an angle of less than 25° with the long axis of the ischium. The articulatio pubica makes an angle of about 40° with the long axis of the ischium and of about 60° with the articulatio iliaca. In *Teratosaurus suevicus* these different angles are respectively 55°, 75° and 130°.

If we compare the fibula of the present form with that of *Plateosaurus Quenstedti*, we are at once struck by the great difference between the two. The proximal end of our fibula has a large posterior process, while the posterior border of the upper end of the fibula of *Plateosaurus Quenstedti* is evenly rounded. The shaft in our form becomes a narrow rod in the middle, while in the fibula of *Plateosaurus Quenstedti* it is proximally very broad and distally only slightly narrower. The medial view of the distal end of the fibula of *Plateosaurus Quenstedti* does not show the medial ridge of our form. The anterior ridge of our form is broad distally, but it does not bear a smooth surface as in *Plateosaurus Quenstedti*. Our fibula also differs from *Gresslyosaurus* cf. *Plieningeri* through its large proximal posterior elongation.

It appears, therefore, that the present form is new and belongs to a new genus. The form is allied to *Aetonyx* and *Massospondylus* and is, therefore, an *Anchisaurid*. I propose to call this new form *Dromicosaurus gracilis* n. g. et sp. (δρομικός=quickly walking). The slender leg must have enabled the animal to go quicker than, for example, *Eucnemesaurus* and also implies a more slender form.

Massospondylus Browni SEELEY.

The remains which are being described under this name have been discovered on the farm St Fort (Letsoanastad No. 528 of 1905 map of Bethlehem District) by its owner, Mr H. WALKER, who very generously presented them to our institution. They consist of a vertebral column, front and hind legs, pectoral and pelvic girdle, all of one animal. The exact spot of the occurrence is in the Red Beds on the boundary between Clifton and St Fort immediately to the north of an old road through a Nek crossing this boundary, the Nek lying to the north of a hill which projects into the big bend of the Little Caledon River on St Fort. The spot lies about ten feet below the thick banks of the Cave Sandstone. A good search was made for the skull and a portion of the neck, which could not have been removed by weathering, but nothing further was found.

Cervical Vertebrae.

Five of the neck vertebrae have been preserved. They form an unbroken series, the last of which is at the same time the last neck vertebra (Pl. XXI, fig. 3). They are all in very bad condition, flattened and crushed, and the last one is nearly unrecognisable. The lengths of their centra are, from the anterior one backwards, 9 cm., 9 cm., 7·5 cm., 7·5 cm. and ? cm. As preserved the first and second of the series are slightly keeled, especially anteriorly and posteriorly. The third and fourth are more strongly keeled, although their lower borders are still concave. The fifth is strongly keeled, but that is all that can be said about it. Most of the dimensions are useless, and the general appearance of the vertebrae will be best understood from the figures. The breadth of the dorsal spine in the first four vertebrae is respectively about 5 cm., about 6 cm., about 5 cm. and 4·5 cm. The praezygapophyses of the second vertebra have a length of about 4·5 cm. The articulation surfaces of all the zygapophyses converge downwards. There is a slight ridge on the neural arch, just above and parallel with the neural suture. Posteriorly this ridge is evenly rounded, but in the third vertebra its lower side is hollow over about two-thirds of its length starting in front, and it forms, therefore, a downward leaning crista over this distance. In the more anterior vertebrae this crista is shorter. The diapophysis is situated on the anterior portion of this crista. It is not preserved. The parapophysis, which is situated near the anterior edge of the centrum, is either broken off or covered by the proximal end of a rib. Some of the ribs of the neck vertebrae are in good preservation. The tuberculum branches off from near the proximal end of the rib under an acute angle. Its articulating end is broken off in most instances; a portion of it is preserved in one rib and it is shown to be hollow upwards. In this specimen its length is 2 cm. This rib probably belongs to the fourth vertebra of the series; its probable fellow is also present. The capitulum is an inward process, which is not given off at the extreme proximal end of the rib, but slightly distal to it. The rib therefore has a small anterior process in front of the base of the capitulum. The capitulum is a thick round process directed forwards and inwards, with an expanded, circular, hollow articulation surface. In the ribs which probably belong to the fourth vertebra of the series its length is 5 and 7 mm. and the breadth of its articulation surface 8 mm. The length of the capitulum of the third vertebra is 3 mm. and the breadth of its articulation surface 9 mm. In the second vertebra the rib has a capitulum with a cup-shaped articulation surface attached to its inner side and near its end. The ribs were so long when they were found that their thin distal ends projected beyond the hinder ends of the vertebrae. The right rib of the first vertebra still shows a length of 8·5 cm. and both ends are broken off.

Dorsal Vertebrae.

All the dorsal vetebrae have been preserved, but in such a bad condition that the exact number of dorsals cannot be given with absolute certainty. If the remains of a vertebra behind the last neck vertebra are those of the first dorsal, then the second dorsal is only represented by its zygapophyses. From the third onwards the series is complete. It is difficult to decide which vertebra is the last dorsal. If the above assumption is right, then the fifteenth of the series was the first between the ilea. For reasons which will be stated later, I take this vertebra to be the first sacral. The number of dorsals therefore is 14, if the assumption of the first dorsal is right. It is not impossible, although very improbable, that a vertebra is missing between the last neck vertebra and what is here called the first dorsal. It is also possible that more than one vertebra is missing between the first and the third dorsal. This, however, is also very improbable, for the fossil was excavated by myself and there was sufficient space for one vertebra only at this spot. It is therefore fairly certain that the fossil did not have more than fourteen dorsal vertebrae.

The postzygapophyses of the first dorsal are very long, their length being 2 cm. Those of the second and third are slightly shorter, while those of the fourth have a length of 1·2 cm. The processus spinosus of the fourth vertebra has a height of 3 cm. while its length is slightly more than 3 cm. The length of the centrum of the fourth vertebra is about 5 cm.; that of the sixth, the ninth, the tenth, the twelfth and the thirteenth is about the same. All the vertebrae are so flattened, however, that it is impossible to give accurate dimensions, and the above are only given to assist one in getting some idea of the size. The eighth vertebra shows a thick and nearly vertical posterior supporting ridge of the processus transversus. The ninth shows also the narrow anterior one, which slopes forwards and downwards; at its anterior end lies the large parapophysis. In the tenth vertebra (Pl. XXI, fig. 2) the posterior supporting ridge is thick and connects the processus transversus with the posterior edge of the centrum. The anterior supporting ridge lies nearly horizontal. At its anterior end and at the base of the praezygapophysis lies the large parapophysis, completely above the centro-neural suture. In the eleventh vertebra the posterior supporting ridge is thick and the anterior ridge thin, but the last is shorter than in the tenth vertebra. In the twelfth vertebra the posterior supporting ridge is thick and the anterior one thin; the anterior one is shorter than in the eleventh dorsal and to such an extent that the transverse process and the parapophysis are nearly touching each other. The processus spinosus of the tenth vertebra has a height of 3·7 cm. and a breadth of 4·4 cm.

SACRAL VERTEBRAE.

The three sacral vertebrae have also been preserved, but they are in the same condition as the dorsals. The second sacral is the longest; its length is 5·4 cm. That of the first sacral is 4·4 cm. and that of the third 3·8 cm. These three vertebrae were found between the ilea. In the *Plateosauridae* the second sacral is the longest and for this reason I take the longest of the present three to be the second sacral. The vertebra in front of it must then be the first sacral and the one anterior to that the last dorsal.

CAUDAL VERTEBRAE.

An unbroken series of eleven caudal vertebrae has been preserved (Pl. XX, fig. 5). The first caudal is only represented by an anterior and a posterior piece of its centrum. Haemapophyses are present on all the caudals beginning with the first, except on the fourth from which it is missing. I cannot be quite sure that there is nothing missing between the last sacral and what I call the first caudal, because there was a slight fault in the rock which had displaced the two bones with regard to each other. I think it very unlikely, however, that a vertebra is missing between them. The first caudal was wedge-shaped. The length of the lower surface of the centra and their anterior height is as follows: second caudal 4 cm. and 4·5 cm., third 4 cm. and 4 cm., fifth 4·8 cm. and 3·7 cm., sixth 4·5 cm. and 3·4 cm., seventh 4·5 cm. and 3·4 cm., ninth 4·2? cm. and 2·8 cm., eleventh 4·3 cm. and 2·6 cm. Through the crushing of the vertebrae, which, however, is not so great as in the dorsals, these measurements do not give the actual size of the original uncrushed bones; they are, however, not far out, and they give some idea of the relative size of the vertebrae. From the second caudal onwards the lower surface of all the centra is grooved. This groove is more clearly visible in the sixth to the eleventh caudal. The groove is deep in its posterior end, where it cuts slightly into the lower margin of the posterior articulation surface. The transverse processes are broad and thin; they are directed outwards, backwards and upwards. Their base is still broad in the last vertebra. The dorsal spines are high and narrow; even the dorsal spine of the third caudal only attains a breadth of 1·7 cm. in its upper end, which is much less than half that of the tenth dorsal. Its length was about 6 cm. The dorsal spines of the sixth to the tenth caudal are preserved. There is an interval between them and the praezygapophyses. Their anterior edge is sharp. The length of the seventh is nearly 6 cm.; that of the tenth nearly 4·5 cm. The posterior edge of the dorsal spine is a sharp ridge above, but below this sharp ridge runs into a groove formed by the backward projecting lower end of the sides of the spine. The praezygapophyses are long and stand out forwards and upwards. Their articulation surfaces are perpendicular in the sixth to the tenth caudal (the others are not or too badly preserved) and each is parallel with its fellow. The postzygapophyses are short and are situated high up behind the dorsal spine.

The haemapophysis of the first caudal has lost its proximal and its distal end. As preserved its length is 9·5 cm. That of the second caudal has lost its distal end only and its length as preserved is 11 cm. There is a deep groove downwards from the proximal end on the anterior and on the posterior edge. The haemapophysis of the ninth caudal was also longer than 11 cm. The proximal end has two articulation surfaces, a larger anterior one and a narrow, half-moon shaped posterior one. The two surfaces stand in such a way that, when they are applied to the vertebra, the axis of the haemapophysis makes an angle of about 45° with the axis of the vertebra.

SHOULDER GIRDLE.

Scapula and coracoid of the right side are present, but also in very bad condition.

The scapula (Pl. XVII, fig. 1) has a length of 25·5 cm. Its breadth at the narrowest place in the middle is 3·8 cm. Its breadth at the distal end cannot be given accurately for the upper corner is broken off; as preserved it is 5·2 cm.; it may originally have been 7 cm. The breadth at the proximal end, from the top of the processus deltoideus as preserved to the lower border of the facies glenoidalis pro humero, is 8·5 cm.; originally this may have been 10·5 cm. The thickness of the scapula at its distal end is 0·9 cm. Near the lower border of the curved portion the thickness is 1·7 cm. The thickness of the bone at the articulation surface for the humerus is 2·8 cm. The distal edge is broken off and nothing is visible of a thickening at this border. This may also be the result of crushing. The processus deltoideus is broken off. There is an indication of a circular depression in front of the processus deltoideus, but there is not a trace of a distal sharp edge to this depression. The articulation surface for the humerus is broad. Its inner portion projects further downwards and forwards than its outer portion. The distal end of the scapula is straight; in its proximal half, however, the bone is curved with the concavity inwards.

The coracoid (Pl. XVII, fig. 1) is an outwardly convex and inwardly concave plate. A large piece of its upper portion is lost. The upper portion is thin and the lower portion thicker. The articulation surface for the humerus is too much damaged for description and the articulation surface for the scapula is covered by that bone. The foramen supracoracoideum lies at a distance of

5·5 cm. above the lower border. It is a round opening of about 9 mm. diameter. The foramen passes obliquely through the bone, upwards, backwards and inwards.

HUMERUS.

Both humeri have been preserved, but both have suffered much from pressure. The proximal plate of the right humerus has been flattened and broadened, while the plate of the left one has been compressed. The shaft of the right humerus has been twisted.

The length of the humerus is 20·5 cm. in the left (Pl. XVII, figs. 2 and 3) and 21·5 cm. in the right bone. The broad surfaces of the distal end of the humerus make an angle with those of the proximal plate. The thick medial border of the proximal plate is concave. The caput humeri is not situated at the extreme end of the medial border, but it lies more inwards on the upper border, of which it forms the highest point. From here the upper border runs outwards and downwards to the lateral side. The fossa bicipitis lies below this border and is bounded medially by the thick medial edge and laterally by the convexity of the crista radialis. It does not pass on to the shaft. The crista radialis projects from the lower end of the lateral side of the plate. Its height is about 0·6 cm., and its length about 5 cm. The upper end of the crista stands out from the rest of the lateral border towards the medial side and consequently the medial surface of the crista and a portion of the plate near it is convex. The posterior surface of the plate is convex, except the portion medial to the caput humeri, which is concave, and the posterior surface of the crista, which is also concave. There is a circular depression on the posterior surface inwards of and slightly above the lower end of the crista. This cavity is not accidental, for it is present in the same position in both bones (fig. 2 of Pl. XVII shows it plainly). The lower end of the crista radialis lies at a distance of 11 cm. from the distal end of the condylus lateralis. The distance between the upper end of the crista and the medial upper corner of the bone is 10 cm. in the left bone and is nearly 12·5 cm. in the right one. It seems as if the dimensions of the left bone are nearer to the original.

The breadth of the shaft at its narrowest place is 2·5 cm. Its thickness there is 3·3 cm. (left bone). The breadth of the distal end is 7·4 cm. in the left and 7 cm. in the right bone. The distal end of both bones (text-fig. 22) is flattened and therefore broader than originally. A rounded ridge runs from the lower end of the crista radialis right to the distal edge of the condylus lateralis. A broad, low ridge passes from the condylus medialis upwards on the shaft and disappears near the middle of the bone. Between these two ridges the anterior surface of the distal end is strongly concave. This concavity becomes narrower and shallower upwards and disappears in the middle of the shaft. The posterior surface of the distal end is concave along its middle, but it seems that this concavity is at least greatly exaggerated by pressure. The condyles are not produced backwards and they stand out slightly anteriorly. The articulation

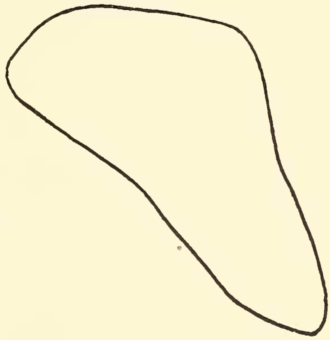
Text-fig. 22. *Massospondylus Browni*. Left humerus. Outline of distal end seen from below. Anterior border above. Nat. size.

surface stands at right angles to the axis of the bone. The ulnar condyle is broad and not thick, the radial condyle is narrow and thick. Thickness of the ulnar condyle 2·5 cm., of the radial condyle 3·5 cm. Breadth of the ulnar condyle about 3 cm. and of the radial condyle 1·5 cm., all of the left humerus.

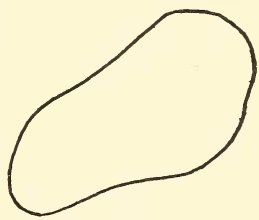
ULNA AND RADIUS.

Both lower arms are present. Ulna and radius of the right arm have suffered badly from pressure. Those of the left arm have also suffered, but they are in better condition than those of the right.

Ulna. The left ulna (Pl. XVIII, figs. 2 and 4) has a length of 14 cm. The postero-medial edge of the bone has a sigmoidal shape, its upper end being convex and its lower end concave inwards and forwards; the antero-lateral edge is proximally concave outwards, in the middle straight or slightly convex and its lower end again concave towards the lateral side. The proximal end is slightly bent forwards and runs out anteriorly into a sharp point. The posterior portion of the proximal end is much higher than the anterior portion, the difference in height being 1·7 cm. This portion is dome-shaped; in front of it lies the concave articulation surface. The antero-medial border of the proximal surface (text-fig. 23) is sigmoidal. Its anterior end is convex; in the middle it is concave and its extreme posterior end is convex. The lateral border of the proximal surface is slightly concave, while the hinder border is convex backwards and upwards. The proximal surface has a triangular shape. The anterior angle is very sharp; the postero-medial angle, formed by the antero-medial border and the hinder border, is also acute, but broadly rounded, while the latero-posterior angle, formed by the posterior and lateral borders, is obtuse. The shaft is concave below the lateral border of the proximal surface. Below the posterior border the surface of the shaft is concave in one bone and convex in the other; it seems that the concavity is wholly due to pressure and that, therefore, the bone was originally convex in this region. In both cases the latero-posterior angle of the proximal surface and the surface of the shaft for a short distance beneath it stand out from the bone backwards and outwards. The antero-medial border of the proximal surface has a length of 5·4 cm., the lateral border a length of 4 cm. and the hinder border a length of 3·2 cm. The thickness of the bone, taken over the latero-posterior angle, is 2·4 cm. The antero-medial surface of the bone is concave from the antero-lateral border to the postero-medial border. Whether this was originally so in the middle of the shaft is not certain. The postero-medial edge of the whole bone is broadly rounded; a large portion of its upper end is rough and served for the attachment of muscles. The upper part of the antero-medial surface is covered with short longitudinal grooves, which probably served for the



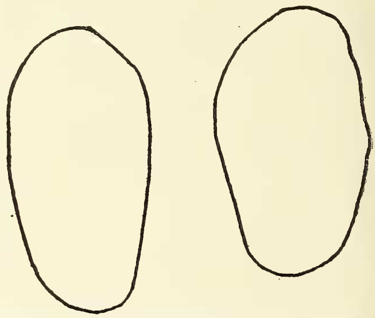
Text-fig. 23. *Massospondylus Browni.* Left ulna. Outline of proximal end seen from above. Anterior end below and antero-medial border to the left. Nat. size.



Text-fig. 24. *Massospondylus Browni.* Left ulna. Outline of distal end seen from below. Medial end to the left, posterior border below. Nat. size.

attachment of ligaments. At its narrowest place the shaft has a breadth of 2·3 cm. and a thickness of 1·2 cm. The distal end (text-fig. 24) has a breadth of 3·7 cm. and a thickness of 1·9 cm. Its anterior end is turned to the lateral side and its posterior end to the medial side. Its long axis makes an angle of about 25° with the long diameter of the proximal end. The distal articulation surface has two facets. The postero-lateral part of the articulation surface passes somewhat upwards on to the shaft. The antero-medial edge of the distal end of the bone has two longitudinal ridges, separated by a groove. The postero-lateral ridge is high, the antero-medial one forms the slightly prominent border of the antero-medial surface.

Radius. The radius (Pl. XVIII, figs. 1 and 3) has a greatest length of 13·3 cm. The antero-lateral edge of the bone has a length of 12·3 cm. The proximal end of the radius is broad and thin (text-fig. 25). Its breadth is 3·6 cm. This was originally a few millimetres more, for the postero-medial corner of the proximal end is broken off. Its thickness is 1·7 cm. The proximal articulation surface is concave from the high posterior end of the antero-medial border to the slightly lower anterior end of the postero-lateral border. The breadth of the shaft at its narrowest place is 1·8 cm. and its thickness 1·3 cm. The distal articulation surface has a length of 3·5 cm. (text-fig. 25) and a breadth of 1·9 cm. The fairly flat surface slopes from the postero-medial corner downwards to the antero-lateral end. Both the antero-lateral and the postero-medial edges are concave, but the antero-lateral one is convex at the distal end. This gives the impression that the distal end is bent slightly backwards and to the medial side. The distal end of the antero-lateral edge bears a sharp ridge, which runs from the articulation surface upwards for a short distance, and which leans forwards. The postero-medial edge of the distal end is fairly sharp.



Text-fig. 25. *Massospondylus Browni.* Left radius. Outline of proximal and distal end seen from above and below respectively. Anterior border above. Nat. size.

CARPUS.

Two carpalia are preserved in both hands. Those of the right hand, however, are fragmentary. A large flat bone was situated behind the first metacarpale and is apparently the first carpale. A small bone was situated lateral to this one and was evidently displaced. It is most probably the second carpale. Both bones have been completely covered by cartilage.

First carpale (Pl. XVII, fig. 5). The breadth of the bone is 4 cm. This may have been slightly greater, for the extreme upper medial corner is broken off. Its height is 2·5 cm., its medial thickness 1·1 cm. and its lateral thickness 0·8 cm. The medial portion of the anterior surface is convex in its lower half, while its upper half is concave. The lateral portion of the anterior surface is also concave. The two concave surfaces are separated by a rounded ridge. The lateral concave surface occupies about one-third of the anterior surface. The posterior surface is convex. The upper edge of the bone is slightly damaged. The medial edge is thick, and convex forwards, inwards and downwards. The lower edge is broad and in its middle lies a pit, probably for the attachment of a ligament. The lateral edge is thin and projects towards the lateral side in its middle. The upper edge was thin. This bone can be fitted on to the proximal end of the first metacarpale in such a way that the upper edge of the bone lies at the same level as the upper edge of the proximal articulation surface of the first metacarpale. In this case the lower and the medial edges of the carpale project downwards beyond the lower edge of the articulation surface of the metacarpale. The ridge on the anterior surface of the carpale will then lie on the lateral proximal edge of the metacarpale, so that the whole concave lateral portion of the anterior surface of the carpale projects beyond the lateral side of the metacarpale.

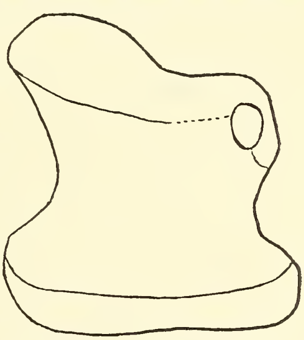
Second carpale (Pl. XVII, fig. 6). The greatest dimension of the bone is 2·5 cm. When fitted in position, this dimension runs from above downwards and inwards. Its breadth is 1·3 cm. Its thickness below is 1 cm. and above it ends in a sharp edge. Its posterior surface is convex and its anterior surface concave. Its nearly square lower surface is flat and has a pit in the middle for the attachment of a ligament.

The second metacarpale fits exactly with its convex posterior surface into the concave lateral portion of the anterior surface of the first metacarpale. Its upper end lies in this case near the lateral production of the lateral border of the first metacarpale, and its lower surface lies practically in the same plane as the lower proximal edge of the first metacarpale. The two ligament pits are then exactly opposite each other. When the second metacarpale is now fitted into place, it will be found that its proximal surface lies practically at the same level as that of the first metacarpale. The second carpale appears to be situated between the second metacarpale and the first carpale, while on its medial side it touches the first metacarpale and on its lateral side would probably touch the third carpale.

HAND.

Both hands are complete, but the left one is much better preserved than the right. The hand will be described as if it were stretched out with the palmar side downwards. Compare also Pl. XVIII, fig. 5, Pl. XIX, fig. 1 and text-figs. 26 and 27.

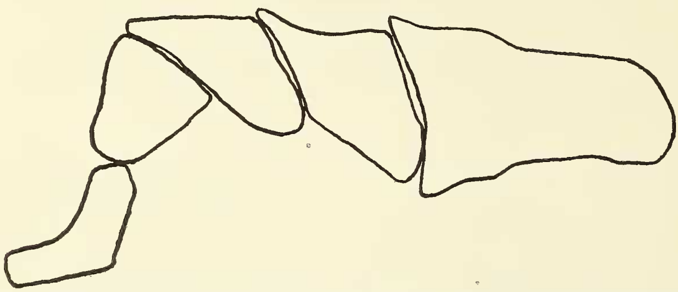
Metacarpale I can easily be recognised from the others by its remarkable shape (text-figs. 26 and 27). The proximal articulation surface has a quadrangular shape. The two lateral corners of this quadrangle are drawn out and far apart, while the two medial corners are rounded and close together. The shaft is very short. Two ridges run towards the distal end from the lateral corners of the proximal end. The ridge starting at the lower lateral corner is sharp and high and ends in the middle of the shaft. The superior lateral ridge is also high and sharp, but it runs right down to the distal end, where it branches around the lateral collateral pit. The lower medial corner of the proximal articulation surface is nearer to the distal end than other parts of the surface. The axis of the distal articulation surface is not parallel with that of the proximal surface. Its lateral end is higher and its medial end lower than in the proximal axis and moreover the lateral end projects much further distally than the medial end. The distal end is therefore twisted to the medial side. The two portions of the distal



Text-fig. 26. *Massospondylus Browni.* Metacarpale I of the left hand. Outline view from above and slightly medial, showing the extent to which it was covered with cartilage. Nat. size.

articulation surface are divided by a groove. The two collateral pits are deep. The articulation surface runs right round on the lower border of the medial collateral pit. The lateral portion is drawn out to a point above the lateral collateral pit and also below it. The lower surface is sharply concave immediately behind the groove dividing the portions of the articulation surface.

Metacarpale II is the longest. Its proximal articulation surface is triangular (text-fig. 27). The whole surface is convex. Laterally it runs out into a narrow strip. This is the proximal face of a very high, thin ridge, which subsides on the shaft before reaching the distal end. A ridge runs from one of the corners of the proximal surface over the upper surface of the bone towards the distal end, and disappears before reaching the middle of the shaft. The lower surface of the proximal end has a broad, low ridge, which starts near the proximal surface and runs towards the middle of the shaft. There is a small concavity on both sides of this ridge. The inferior part of the distal end is much broader than the superior part, for the medial collateral pit opens upwards and inwards. Both collateral pits are deep. A division of the distal articulation surface is only indicated. The articulation surface passes much further on to the lower than on to the upper surface of the bone. The distal end is twisted somewhat to the lateral side.



Text-fig. 27. *Massospondylus Browni*. Left hand. Outline in relative position of proximal ends of metacarpalia. Metacarpale V is deformed and could not be fitted into position. Nat. size.

Metacarpale III. This is shorter and much more slender than II. Its proximal articulation surface is also triangular. The three ridges running from the corners of the proximal surface along the sides and upper surface of the shaft towards the distal end subside in the shaft before reaching its middle. The lateral portion of the lower surface of the proximal end is concave; its narrower medial portion is occupied by a broadly rounded ridge, which subsides in the middle of the shaft. The inferior part of the distal end is broader than the upper part, because both collateral pits open upwards. The articulation surface passes further on to the lower than on to the upper surface of the bone. The distal end is twisted somewhat to the lateral side.

Metacarpale IV is more slender than III. Both its ends are relatively thicker. The proximal end has a triangular shape (text-fig. 27), but the upper angle does not lie in the middle of the upper surface as in the metacarpalia II and III, but on the extreme medial side. The upper angle is a thick rounded knob, which continues on to the shaft for a very short distance only. The lower medial angle is sharp and it sends a very short, sharp ridge forwards. The lateral angle is broadly rounded. The distal end is narrow and thick. The upper and lower breadth is practically the same. The shaft has a triangular section with a vertical medial side. The distal end is slightly twisted to the medial side.

Metacarpale V is different in the two hands, but the left has suffered from pressure and the right has completely escaped this misfortune (text-fig. 27). The proximal end has a triangular shape of the same type as that of metacarpale IV, only narrower and higher. The upper angle, which lies on the extreme medial side of the upper surface, is very broadly rounded. The lateral corner is also very broadly rounded. The lower medial corner is sharp and narrow; between this corner and the upper one lies a concave surface. The proximal articulation surface is greatly convex, except the lower portion, which is concave. The upper corner passes further forward on the shaft than any other portion of the articulation surface. The distal end is convex. Laterally it runs out into a knob-like point; medially it is broadly rounded. A section of the shaft is more or less triangular, with a nearly vertical medial side and a convex lower one. The longest dimension of the distal articulation surface stands from above downwards and inwards. This metacarpale does not possess collateral pits.

Phalanges. The first phalanx of the first digit is a remarkable bone. Its distal end is twisted nearly 45° on its proximal end. The proximal articulation surface has a trapezoidal shape. Its lateral side, however, is convex and its medial side is concave above and convex below. The lower medial corner of the surface is tongue-shaped and projects far to the medial side. The whole surface is deeply convex; it is divided into two unequal portions by a slight ridge; the lateral portion is the larger, the medial portion only consisting of a narrow strip along its concave border and of the tongue-shaped lower corner. The lower border is slightly concave below the end of the ridge over the articulation surface. The distal end is pulley-shaped. The groove between the two portions stands obliquely from above downwards and inwards. Its lateral side projects further forwards than its medial side, but the medial portion of the articulation surface passes further backwards on the lower surface than the lateral portion. The lateral collateral pit is deeper than the medial one.

Excepting the claws, the phalanges of the second and third fingers have all the same general shape. The contour of the proximal surface of all these phalanges is trapezoidal. The proximal articulation surface of II, 1 and III, 1 is deeply hollow and not divided by a ridge. The upper posterior end of the phalanges does not project far backwards. The lateral side of their distal end projects further forwards than the medial side. The distal end of II, 1 is twisted to the lateral side, that of III, 1 slightly so. There is a slight concavity behind the anterior articulation surface on the upper surface of the bone. The lateral collateral pit is deeper than the medial one.

As in the foot there is no pit behind the articulation surface on the upper surface of all the penultimate phalanges of the hand. The proximal articulation surface of both penultimate phalanges of the second and third fingers is divided into two portions by a ridge. The lateral portion is broader than the medial one. The penultimate phalanx of the second finger differs from that of the third, except in size, through the upper portion of the medial border of the proximal surface being concave in the former and straight in the latter. A further difference is, that in the penultimate phalanx of the second finger the lateral side of the distal articulation surface passes slightly further downwards than the medial side, whereas in the penultimate phalanx of the third finger this is just the reverse. Both phalanges have a broad and thick upper posterior process. The distal articulation surface of both phalanges passes much further backwards on the lower than on the upper surface. Their lateral collateral pit is deeper than their medial one.

The second phalanx of the third finger has a divided proximal articulation surface. There is no pit behind the distal articulation surface on the upper surface of the bone, and contrary to the condition in the penultimate phalanges of the second and third fingers, where one side of the distal end does practically not project beyond the other, the lateral side of the distal end of this phalanx projects beyond its medial side. The lateral collateral pit is deeper than the medial one. The lateral portion of the distal articulation surface of II, 1, III, 1 and III, 2 is broader than the medial portion.

The fourth and fifth fingers are remarkable. The fourth has only three phalanges and the fifth only two. The phalanges of both fingers can be recognised by their plainness. None of them has a superior-posterior process. The first phalanx of the fourth finger has an evenly concave proximal articulation surface. The distal articulation surface is evenly convex; there is no pit behind it on the upper surface. The second phalanx has an evenly concave proximal and an evenly convex distal articulation surface. There is no pit on the upper surface. The collateral pits are represented by very slight concavities, bordered below by a knob-like process. The endphalanx of this finger is a remarkable, small, three-edged body. Two of the edges border the very slightly concave articulation surface. The third edge forms the sides and the anterior end of the bone. The first phalanx of the fifth finger has an oval-shaped evenly concave, proximal articulation surface. It stands somewhat obliquely on the axis of the bone, the superior border lying further forwards. The distal articulation surface is evenly convex and its lower lateral side sends a small process backwards below the collateral pit. The endphalanx of the fifth finger has the same general shape as the endphalanx of the fifth digit of the foot. Its proximal articulation surface is oval-shaped and very slightly concave. It stands obliquely on the axis of the bone for its superior edge lies much further forwards than its inferior one. The inner edge of the bone is straight and the outer-anterior one evenly convex from the inner-anterior end to the outer-posterior end. The anterior portion and part of the outer portion of this edge has been covered with cartilage.

The clawphalanx of the first finger is high and strongly curved (Pl. XVII, fig. 4). The groove for the claw lies slightly deeper on the medial than on the lateral side. There is a broad ridge on each side below this groove. The highest part of this ridge on the medial side lies below its middle line, while the highest part of the lateral ridge follows the middle line of the ridge. The proximal ends of both ridges terminate some distance in front of the articulation surface by a low, sharp, curved ridge. The medial ridge passes further backwards than the lateral one. The distal end of the medial ridge lies slightly higher than that of the lateral one. There is a broad thick boss on both sides in front of the middle of the articulation surface. The boss on the lateral side is thicker and is situated higher up the side of the bone than the medial one. The bosses are separated from the just mentioned ridges on their respective sides by a broad groove. These grooves pass downwards and backwards above the boss for the flexor tendon, where they become deep and narrow, and continuing come very near to each other behind it. Upwards they are continuous with the grooves for the claw. The tuberositas for the flexor tendon is divided into two portions by a longitudinal groove, which lies to the lateral side of the middle line on the lower surface. The lateral portion of the tuberositas, which lies higher on the lateral side than the inner portion on the medial one, is high and narrow, while the inner portion is low and broad. As in all these clawphalanges, the articulation surface is divided by a vertical ridge into two parts, of which in this case the medial one is slightly broader in its lower end than the lateral one. Through the position of the distal articulation surface of the preceding phalanx, the clawphalanx must lie obliquely from above downwards and inwards. The clawphalanges of the second and third fingers are much less curved. The lateral groove for the claw is slightly higher than the medial one, although the difference in height is scarcely noticeable in the third clawphalanx.

Measurements of metacarpalia and phalanges of the left hand in centimetres (for the fifth metacarpale those of the right hand have been substituted):

	Length	Proximal		Distal		
		Breadth	Thickness	Breadth		Thickness
				inf.	sup.	
I	4·2	3·4	2·4	3·4	3·3	1·7
I, 1	3·5	3·2	2·7	2·2	1·2	2·1
I, 2	6·3	1·6	3·4	—	—	—
II	5·6	3·2	1·6	2·6	1·7	1·8
II, 1	2·8	2·5	2	2·1	1·4	1·6
II, 2	2·7	1·9	1·9	1·7	1	1·6
II, 3	4·6	1·3	2	—	—	—
III	5·1	2·6	1·2	2	1·3	1·2
III, 1	2·3	1·9	1·4	1·8	1·2	1·1
III, 2	1·9	1·6	1·5	1·6	1·1	1·1
III, 3	1·8	1·4	1·3	1·3	0·8	1
III, 4	3·1	1·4	1	—	—	—
IV	4·3	1·8	1·6	1·5	1·3	1·1
IV, 1	1·8	1·4	1	1·2	1	0·9
IV, 2	1·2	0·9	0·9	1	0·6	0·6
IV, 3	0·6	0·7	0·5	—	—	—
V	2·8	1·7	1·6	1·5		1
V, 1	1·6	1·3	0·8	1		0·6
V, 2	1	0·7	0·5	—	—	0·3

A few millimetres are missing from the extreme end of the clawphalanx of the first finger. The length of its lower surface has been taken for the length of the ultimate phalanx of the fourth finger.

Ileum.

Both ilea are preserved, but they have suffered greatly from pressure. The ileum is a broad plate with a short spina anterior and a long spina posterior (Pl. XIX, fig. 2). The acetabulum cuts deep into the bone and is bordered in front by a long processus praeacetabularis and behind by a short processus postacetabularis. The upper portion of the ileum is thin, the lower portion thicker. Both spina anterior and posterior are directed outwards and the outer surface of the bone is therefore concave. The length of the bone from the spina iliaca anterior to the spina posterior is 19·9 cm. in the left and nearly 21 cm. in the right ileum. The upper border, which is damaged, is convex. The outer surface of both spinae and of the upper border as far as preserved is coarse, and has apparently served for the attachment of muscles. This coarse surface is especially large on the spina posterior. The hinder end of the spina posterior is truncated. Nothing can be said of the medial surface of the bone, for in both cases it is covered by matrix and other bone material, which could not be removed. The height of the ileum, from the processus postacetabularis to the upper border, is 13 cm. in the left and 13·5 cm. in the right ileum. The acetabular notch has a depth of 5 cm. and a breadth of 10 cm. in the left ileum. The crista supra-acetabularis projects to the lateral side as a sharp, thin ridge from the proximal two-thirds of the processus praeacetabularis. Probably it continued right down to the distal end of the processus praeacetabularis. This ridge becomes thicker and lower on the iliac plate, where it dies out before reaching the processus postacetabularis. The acetabular surface has a breadth of 3 cm. in the left ileum and of 4 cm. in the right one. It is concave in all directions. The inner border of the acetabular surface is a sharp ridge. The processus praeacetabularis reaches further forwards than the spina iliaca anterior. There is a deep notch between the two, which is much wider in the right than in the left ileum, probably a result of pressure. The length of the processus praeacetabularis is 9·5 cm. There are two sacral ribs (?) on the medial side of the right ileum. The posterior one is situated on the hinder border of the bone, and both have been pressed into the bony matter of the ileum. They are just where one expects the crista medialis. The acetabulum of the left ileum gives one the impression that in the natural position of the bone the end of the spina iliaca anterior was situated nearly perpendicularly above the head of the femur.

PUBIS.

Both pubes are present, but in a very bad condition. The distal portion of the right pubis is missing. The processus subacetabularis and the downward bent portion at the upper inner corner of the pubic plate of both pubes are missing (Pl. XIX, fig. 3). When found the pubes were lying parallel and near to each other, but there was no bony connection between the pubic plates. However, it seems not improbable that the pubic plates were originally coalesced. The medial borders of both plates are fractured over their whole length. Although very much flattened, the right pubis still shows that the neck has an anterior and a medial surface, which round off broadly into each other. The lateral posterior surface of the neck is convex. The inner border of the neck is sharp. The shape of the neck is, therefore, essentially the same as that of the pubis of *Dromicosaurus gracilis*. The length of the right pubis as preserved is 28 cm. The breadth of the pubic plate in the middle, as preserved, is more than 4 cm.

ISCHIUM.

The proximal portions of both ischia are present. They are completely flattened out and so crushed generally, that it will suffice to figure them (Pl. XIX, fig. 4). It seems, however, that the articulatio iliaca made a much larger angle with the general long axis of the bone than in *Dromicosaurus gracilis*.

FEMUR.

Both femora are present, but they are badly crushed. The left femur (Pl. XX, figs. 1 and 2) was broken in several places, but the pieces were fitted together and joined with plaster of Paris by myself; these fractures have had no influence on the length of the bone. Both bones are curved sigmoidally, concave above and convex below towards the front. Most of the curvature, however, has been crushed out of the right femur. The length of both femora is 35 cm. The breadth of the proximal end, measured from the tip of the caput femoris to the lateral side, is 10 cm. in the left and 9·5 cm. in the right femur. These measurements are of course very much exaggerated through the crushing of the bone. The original breadth can easily have been 1 cm. less. The caput femoris is directed inwards; as preserved its height is about 4 cm. and its breadth about 2 cm.; originally the breadth may have been greater than the height. The proximal surface is convex and forms an angle with the lateral side. The trochanter minor lies on the hinder surface at the border of the proximal surface and nearer to the medial end of the caput femoris than to the lateral side of the bone. The upper end of the trochanter major is broken off in both bones. It was situated at a distance of 6·2 cm. from the proximal end in the left femur; this distance is 5·5 cm. in the right bone. There is a broad, deep groove between the lateral side of the trochanter and the general surface of the bone. The height of the trochanter, as preserved in the left femur, is 9 cm. The lower end of the trochanter is not visible. Between its proximal end and the trochanter major the femur was broader and thinner than further downwards. Both bones are so badly crushed that nothing can be seen of the ridge, which in other femora runs from the trochanter major towards the condylus medialis. The lateral side of the proximal end is slightly convex and the medial side concave. Therefore the proximal end of the femur is slightly bent inwards.

The trochanter quartus begins at a distance of 9 cm. from the proximal end in the right femur. This distance is 10 cm. in the left one. It terminates at a distance of 15·5 cm. in the right and 16·5 cm. in the left femur from the proximal end of the bone. This lower end lies at a distance of 18·5 cm. in the left and 19·5 cm. in the right bone from the distal end. The height of the trochanter is 2 cm. Its medial side is steep and its lateral side less so. The proximal end of the trochanter forms a very pronounced ridge; a second ridge, medial to this first one, is only indicated by a slightly greater convexity of the lateral side of the trochanter. The trochanter is situated nearer to the medial than to the lateral side of the bone. Its lateral side is convex and its medial side concave. The fossa intercondyloidea begins at about 11 cm. above the distal end. Its upper end lies nearer to the medial than to the lateral side of the bone, and its lower end is slightly further away from the medial side. The condylus medialis has a breadth of 2·8 cm. in the left femur and a breadth of 2·4 cm. in the right one. In the right femur the condyles have been pressed very much to the medial side and flattened; in the left one they have been slightly pressed to the lateral side. The height of the condylus medialis is 3·8 cm. It projects about 3 cm. from the bottom of the fossa intercondyloidea. The condylus lateralis has a breadth of 2·4 cm. in the right femur. Its height is about 3·5 cm. and it projects about 2·5 cm. from the bottom of the fossa intercondyloidea. The breadth of the distal end of the bone is about 9 cm. in both femora. The distal articulation surface stands obliquely on the axis of the bone, that is to say, if this surface is placed horizontally, then the axis of the bone is directed from below upwards and backwards. The anterior surface of the lower end is slightly concave. The lateral surface is hollow and the condylus lateralis stands out slightly to the lateral side.

TIBIA.

Both tibiae are preserved, but in a very bad condition. The proximal end of the right tibia (Pl. XX, fig. 3) is distorted and that of the left flattened to less than finger thickness. As preserved, the length of the bone is 30·5 cm. The head of the left tibia has now attained a length of about 12 cm. and a thickness of 1·3 cm. at its anterior end and of 3 cm. at its posterior end. The head of the right tibia has a length of 8·5 cm. measured from the hinder end of the condylus lateralis (!) to the anterior portion of the medial border. Its breadth is 5 cm. I give these measurements, which are of no value to our knowledge of the animal they belong to, for reasons which will be discussed hereafter. The tuberositas tibiae of the right tibia is still visible. The lateral condylus of the right tibia is flattened and now forms a kind of lateral posterior process. The concave portion in the lateral border of the proximal articulation surface is slightly deepened, but the notch in the hinder border has been greatly exaggerated through pressure. The articulation surface slopes from behind upwards and forwards. The shaft becomes narrower from the head downwards. The distal end is transversely broad; the bones are so badly crushed that it is useless to say more about them. As far as can be made out, they have the same general shape as other *Theropod* tibiae.

FIBULA.

Of the left fibula only the proximal end is present. The right fibula is complete, but has suffered much from pressure. The original curvature of the bone is completely flattened out. The fibula has the same general shape as the fibula of *Dromicosaurus gracilis*. Its length is 30 cm. The high ridge on the shaft of the fibula of *Dromicosaurus gracilis* is still visible in this specimen as a faint low ridge. The antero-medial corner of the distal end is broken off. The fibula is figured in fig. 4 of Pl. XX.

TARSALIA.

Fragments of the tarsalia of the left and the right side are present, but they are too badly preserved to study in detail.

FOOT.

The right foot is complete (Pl. XXI, fig. 1 and Pl. XXII), and of the left foot the first two toes are present. All the bones, and especially the metatarsalia, have suffered from pressure.

Metatarsale I has a length of 9·3 cm. in the right and 9·6 cm. in the left foot. The bone of the right foot is more flattened than that of the left. As preserved the proximal breadth of the right bone is 4 cm. and that of the left 3·6 cm. The thickness of this end is 1·2 cm. and 1·3 cm. respectively. Posteriorly the proximal end of the bone has a broad rough edge, which passes further downwards into the smooth posterior surface of the shaft. There is a slight angle between the rough and the smooth edge. Proximally the lateral surface bends towards the medial side near the posterior border. Nothing is visible of a ridge on the medial side of the proximal end, but this may be due to pressure. The shaft narrows down to a breadth of 2 cm. and 2·4 cm. and a thickness of 1·5 cm. and 1·1 cm. in the left and right bones respectively. The axis of the distal articulation surface stands obliquely on the axis of the bone; the medial posterior end of the surface is much higher than the lateral anterior end. Further the axis is directed from the front backwards and somewhat to the medial side. The antero-medial part of the articulation surface is undivided. Below and behind it consists clearly of two portions, a large, globose, antero-lateral one and a narrow, transversely elongated, medial portion, which sends a long narrow process upwards, backwards and to the lateral side. There is a deep concavity between the globose portion of the articulation surface and its hook-like process on the postero-lateral surface of the bone. On the under surface the two portions of the articulation surface are divided by a very shallow, broad groove.

Metatarsale II has a length of 14 cm. The proximal articulation surface has the shape of a quadrangle. All four sides of this quadrangle are concave. The deformation makes it impossible to say which side of the bone is more concave than the other. The lateral border of the proximal surface has a length of 3·6 cm., the medial border a length of 3·9 cm., the posterior border a length of 3·1 cm. to 3·3 cm. and the anterior border a length of 2·6 cm. Ridges run from the corners of the proximal surface downwards on to the shaft. The upper end of the antero-lateral ridge is very thin and sharp; the antero-medial ridge is rounded; the two posterior ridges stand out prominently but are deformed. All these ridges submerge into the rounded edges of the shaft. There is a small tuberositas on the lateral border of the anterior surface near the middle of the shaft. At its narrowest part the shaft has a breadth of 2·5 cm. and 2·3 cm. and a thickness of 1·5 cm. and 1·7 cm. in the right and left bones respectively. The distal articulation surface does not stand at right angles to the shaft, its medial end being higher than its lateral end. As preserved, the breadth of the distal end of the right bone is 3·8 cm., its lateral thickness 1·6 cm. and its thickness at the medial side 2·2 cm. The medial thickness of the distal end of the left bone is 2·5 cm. The articulation surface passes higher up on the medial side of the anterior surface of the bone than on the lateral side. Posteriorly the medial side of the distal end has a backwardly directed process, the lower surface of which is a backwardly directed process of the articulation surface. The middle of the posterior surface of the distal end is slightly concave. The greatly elongated lateral collateral pit is much deeper than the medial one. The anterior surface of the distal end is smooth.

Metatarsale III has a length of 15·5 cm. The proximal articulation surface has a triangular shape. The bone is very much flattened, but as preserved, the hinder angle lies towards the medial side. The two anterior angles lie close together. As the medial anterior ridge is broken off the lengths of the medial and anterior borders of the proximal surface cannot be given, but as preserved they are each approximately 2·5 cm. The lateral border has a length of 4·7 cm. The two medial ridges converge downwards and subside into the medial side of the shaft. At this point the medial side of the shaft is slightly convex. The lateral side of the shaft shows a small tuberositas a short distance above this medial convexity. The lateral ridge disappears earlier into the lateral side of the shaft. At its narrowest part the shaft has a breadth of 2·3 cm. and a thickness of 1·3 cm. The axis of the distal articulation surface does not stand at right angles to the shaft, its medial end being higher than its lateral end. The breadth of the distal end is 3·6 cm., its lateral thickness 1·7 cm. and its medial thickness 1·9 cm. The middle of the posterior surface of the distal end is concave. Posteriorly the medial side of the distal end has a backwardly directed process, the lower surface of which forms a backward prolongation of the articulation surface. The anterior surface of the distal end shows a peculiar feature. The centre above the articulation surface is convex. Around and above this convexity there is a half-moon shaped concavity. Above this is the flat anterior surface of the shaft. Both collateral pits are deep, but the lateral one is deeper.

Metatarsale IV has a length of 14 cm. As preserved the proximal portion is very thin; its anterior surface is convex and its posterior surface is concave. Its greatest thickness here is 1·1 cm. and its breadth 6 cm. The bone has suffered greatly from pressure and is quite out of shape. A ridge runs down its anterior surface and starting near the middle of the upper end reaches the medial side above the middle of the shaft. At this point it forms an elongated knob on the side of the shaft. At its narrowest part the shaft has a breadth of 2·4 cm. and a thickness of 1 cm. The lateral end of the distal articulation surface is situated much higher than the medial end. Anteriorly the breadth of the articulation surface is 2·5 cm., posteriorly it is 3·1 cm. The reason of this difference is, that the hinder border of the lateral collateral pit stands out very far laterally. There is no medial collateral pit, the medial surface of the distal end being evenly concave. Posteriorly the medial side of the distal end forms a sharp ridge, the lower surface of which joins up with the articulation surface. The posterior surface of the distal end is concave along its middle.

Metatarsale V. A small piece of the distal end of metatarsale V is broken off. As preserved the whole length of the bone is 7 cm. The whole length may have been 7·5 cm. Proximally the bone is very broad and thin. Its breadth here is 4·3 cm. Laterally the thickness of the proximal end is 1·5 cm., but towards the medial side it rapidly thins down to 0·7 cm. Its medial edge is sharp. The medial end of the upper border of this thin portion is bent slightly backwards; the medial border runs downwards, forwards and outwards. The anterior surface is convex, the posterior concave. The hinder lateral ridge is sharp and runs downwards and to the medial side. At the lower end of this ridge the bone has a breadth of 1·5 cm. and a thickness of 1·3 cm. A broad low ridge starts at this spot on the lateral surface and runs downwards and forwards.

All the phalanges have been preserved. In the following table their measurements are given in centimetres:

	Length	PROXIMAL		DISTAL		
		Breadth	Thickness	Breadth		Thickness
				ant.	post.	
I, 1	5	3·4	2·3	1·5	2·8	2·1
I, 2	7·8	2·2	3·4	—	—	—
II, 1	6	3·3	2·4	2·6	3·4	1·9
II, 2	4	2·9	2·3	1·7	2·5	1·9
II, 3	±6·8	1·8	2·8	—	—	—
III, 1	6	3·7	2·1	2·5	3·3	1·7
III, 2	4·3	3	2	2	2·8	1·6
III, 3	3·5	2·6	1·8	1·5	2·3	1·6
III, 4	—	2·1	2	—	—	—
IV, 1	4·6	3·2	1·8	2	3	1·5
IV, 2	3·5	2·8	1·8	1·8	2·7	1·4
IV, 3	3	2·6	1·7	1·6	2·4	1·4
IV, 4	2·7	2·2	1·6	1·2	2·1	1·3
IV, 5	5·1	1·7	1·8	—	—	—
V, 1	1·8	1·5	0·8	—	—	0·5

Remarks. The anterior breadth of the distal end has been measured across the upper anterior boundary of the articulation surface. The first phalanges can be recognised by the fact that their proximal articulation surfaces are evenly concave and that the hinder border of this surface is straight, at all events not projecting upwards in the centre. All the penultimate phalanges have in common that the distal ends of their anterior surfaces are evenly concave and not pitted. These two characters, therefore, separate I, 1 from all other phalanges. Moreover the distal end of I, 1 is twisted slightly to the lateral side. The posterior border of the proximal articulation surface is higher than the anterior one. The distal articulation surface is unsymmetrical and the articulation ridges of this end run much further upwards on the posterior than on the anterior surface.

The proximal articulation surface of the second, third and fourth phalanges and claws is divided into two parts by a ridge and corresponds with the pulley-shaped articulation surface of the preceding phalanx. The middle of both its anterior and its posterior border projects upwards, however anteriorly more strongly than posteriorly. This anterior upper process is strongest in II, 2. The first claw is more bent than the others. All the clawphalanges are unsymmetrical. The medial portion of the articulation surface of clawphalanges I, II and III is smaller than the lateral portion. In clawphalanx IV I could see no difference in size. Clawphalanges I, II and III hang over towards the lateral side. Clawphalanx IV hangs slightly over towards the medial side. In clawphalanges I and II the edge between the lateral surface and the lower surface is rounded, while the edge between the medial surface and the lower surface is a sharp ridge. In clawphalanx III both edges are sharp, although the medial edge is sharper. In clawphalanx IV the edges are narrow rounded ridges, the one exactly like the other. In clawphalanges I—III the groove for the claw lies deeper on the medial than on the lateral side. In clawphalanx IV the medial groove may be very slightly higher than the lateral one.

The phalanx of the fifth toe has a remarkable shape. It is a flat bone, the shape of which is generally triangular. What is probably the proximal end has a breadth of 1·6 cm. and a thickness of 0·9 cm. What is probably its medial side has a length of 1·8 cm. and is concave. If this is the right position of the bone, which I do not doubt, for the endphalanx of the fifth finger has this position and has the same general shape as the present bone, the anterior and lateral sides form an evenly convex border. The antero-lateral surface is smooth and gives the impression of having been covered with cartilage. Its posterior border goes slightly further down than its anterior border. The anterior and posterior surfaces of the bone are concave.

DISCUSSION.

While comparing the bones of the lower arm with those of the *Plateosauridae* as described by v. HUENE (**5**), it was found that there were certain differences which required an explanation. There is one point which can be decided without difficulty and that is, which of the three angles of the triangular head of the ulna is the anterior one. The articulation surface is of course anterior to the high olecranon-like process and the angle below it must be the anterior angle. This angle lies between the two long sides of the triangle. If the ulna of both arms of our specimen is placed with the anterior angle forwards, it will be found that the longest side of the triangular head lies on the medial side. According to description with text-figure of ulna and radius of *Plateosaurus Reinigeri* v. HUENE it seems to be different at least in this species. Here the longest side of the triangular head lies on the lateral (antero-lateral) side of the bone, and the angle between the two long sides of the triangle lies on the lateral side. The figured right ulna of *Plateosaurus Reinigeri* would have to turn 90° on its axis to place the narrow angle of its upper end in front of the remainder of the head. If the narrow angle of the ulnar head of *Plateosaurus Reinigeri* were pointing forwards, its contour would be placed in the same position as the contour of the head of our right ulna and one would therefore conclude that the described ulna of *Plateosaurus Reinigeri* is also a right one, which it actually is.

Let us now compare the ulna of our form with the description and text-figures of the ulna of *Plateosaurus Quenstedti* v. HUENE. In the text (*l. c.* p. 36) it is stated that the anterior angle lies between a lateral side (the longest) of 9 cm. length and a medial side of 7 cm. length. The posterior side has a length of 6 cm. An upper view is given of the left ulna in the text-figure. Its anterior angle is therein directed downwards, the upper horizontal border is the posterior side, while the long lateral side of the head lies on the right-hand side of the figure. If an upper view of our left ulna is placed alongside of this text-figure, it will be seen that while the anterior angle is directed downwards and the hinder border lies away from the reader, the longest border is situated on the left-hand side of the figure. However, if an upper view of the right ulna of our specimen be placed alongside of the upper view of the left ulna of *Plateosaurus Quenstedti*, it will be seen that the two figures are identical. Moreover, in an adjoining text-figure the lateral side is shown of the left ulna. This lateral side is identical with the medial side of our right ulna. These considerations would lead to the conclusion that, what is supposed to be the left ulna of *Plateosaurus Quenstedti* is really the right one. With the ulna of *Plateosaurus erlenbergiensis* v. HUENE it is the same thing. What is described as the head of the left ulna corresponds with the head of our right one. What is called the right ulna of *Pachysaurus ajax* v. HUENE on p. 143, *l.c.* would be the left one according to our specimen.

From the above may be concluded that the shape of the head of the right ulna of *Plateosaurus Reinigeri* is not identical with the contour of any of the mentioned right ulnar heads; that it would be identical with the contour of the right ulnar head of our form if it were turned 90° on its axis; that the contour of the left ulnar heads of *Plateosaurus Quenstedti*, *Plateosaurus erlenbergiensis* and *Pachysaurus ajax* is identical with that of the right side of our form.

On p. 59 *l. c.* v. HUENE gives a figure and a description of the left radius of *Plateosaurus erlenbergiensis*; the figure presents a medial view. The anterior portion of the medial border of the proximal end and the posterior portion of its lateral border are shown to be high. A medial view of the left radius of our specimen shows the posterior part of the medial border and the anterior part of the lateral border to be high. The contour of a reflected image of the lateral side of our left radius is, however, identical with the contour of the medial side of the left radius of *Plateosaurus erlenbergiensis*; or, in other words, the contour figure of the medial side of the left radius of *Plateosaurus erlenbergiensis* is identical with the contour of a lateral view of our right radius. These considerations would therefore lead to the conclusion, that what is styled left radius of *Plateosaurus erlenbergiensis* is really the right one.

Dr BROOM gave a figure of the left ulna of *Massospondylus Harriesi* (**7**, Pl. XVI, fig. 15) and it clearly shows that the long side of the triangular head lies medial, while the angle between the two short sides lies on the lateral side. This is therefore in full agreement with the ulnae in our specimen.

I would like to point out that our specimen was taken out of the matrix by myself and that no interchanging of bones could have taken place. The left arm was out of the matrix and every bone labelled and packed away long before the right arm was discovered. Moreover, weathering agencies have had a different effect on the two arms, all the bones of the left arm now having a reddish colour, while all those of the right arm are white. Besides, the bones of the left arm have only suffered slightly from pressure, while nearly all the bones of the right arm are badly crushed. Therefore, even apart from my statement, there is every reason to believe that the bones did not get mixed up.

I have given the measurements of the heads of the tibiae, because I would like to prove the folly of describing fragments in such a crushed and flattened condition under new generic and specific names. If the heads of the above described tibiae had been found separate one could never have proven them to belong to the same nor to different species. However, for example *Euskele-*

saurus capensis LYDEKKER sp. is based on a fragment of a tibia, which is crushed and flattened out of recognition. Nobody will ever be able to prove that this species differs from *Euskelesaurus Browni*. The only result of such work can be, that science is for ever burdened by meaningless names and synonyms.

With regard to the affinities of this specimen, it will be clear from the different ilea that it does not belong to *Gryponyx*.

Comparison with *Massospondylus carinatus* shows immediately that its ileum has practically the same shape as that of our form. Length and height of the bone in our form are 20 cm. and 13 cm. and in *Massospondylus carinatus* 22 cm. and about 14 cm. The relations in the two bones are therefore also practically the same. Our individual may, however, have been slightly smaller. Pubis and ischium of our specimen are too much damaged to allow of comparison with those bones of *Massospondylus carinatus*. The femur portion below the trochanter quartus in *Massospondylus carinatus* measures about 22 cm. and the distance of its trochanter major below the proximal end is 9 cm. In the femur of our specimen these distances are 18·5 cm. and 6·2 cm. Relatively, therefore, the trochanter major lies considerably higher in our form than in *Massospondylus carinatus*. The tibia of the present specimen is too much crushed to be used in a comparison. The humerus of *Massospondylus carinatus* is only known from fragments, and radius and ulna are altogether unknown. Metacarpale I of *Massospondylus carinatus* is relatively slightly broader than that of our form. The first phalanx of the second finger is proportionately longer than in our form and the fifth metacarpale is proportionately broader. The first phalanx of the second toe of *Massospondylus carinatus* has the same length as that of our form but is much broader.

Comparison with *Massospondylus Harriesi* (**7**, p. 299). The humerus of this type seems to be slightly longer than that of our specimen. At any rate, the distance from the lower end of the pectoral ridge to the furthest part of the distal end is 12·5 cm. in *Massospondylus Harriesi*, whereas it is 11·5 cm. in our form (11 cm. up to the distal end of the condylus lateralis). Radius and ulna of *Massospondylus Harriesi*, however, are both slightly shorter than in our form. The first metacarpale of our form is absolutely longer and narrower than that of *Massospondylus Harriesi*. In *Massospondylus Harriesi* the first phalanx of the first digit is longer than its metacarpale, in our form this is the reverse. The first claw of *Massospondylus Harriesi* is longer than that of our form. There are numerous small differences in the other phalanges of the hand. The distal portion of the femur of *Massospondylus Harriesi*, measured from the lower end of the trochanter quartus, is 15·5 cm. In our form this portion measures 18·5 cm. The metatarsalia of *Massospondylus Harriesi* are all shorter than those of the present specimen, but where metatarsale I is more than 6 mm. shorter, metatarsale II is only 2 mm. and metatarsale III only 1 mm. shorter. The relations are therefore different. All the phalanges of the foot of our form are longer than those of *Massospondylus Harriesi*, but also relatively more slender.

The relations of the humerus of *Aetonyx palustris* are practically the same as in our form, but the radius is relatively smaller. Relative to the first metacarpale, the first claw of *Aetonyx palustris* is much longer than in our form (the distal width of the first metacarpale as given by BROOM (**7**, p. 305, Pl. XV, fig. 12)). In *Aetonyx palustris* the first metacarpale is practically as broad as long; in our form the breadth is much less than the length. In *Aetonyx palustris* the second phalanx of the second finger is longer than the first and the third phalanx of the third finger is longer than the second.

In our form this is the reverse. Similar differences can be found in the foot.

The lengths of the metatarsalia of *Thecodontosaurus skirtopodus* show relations to each other which differ from those of our form.

Only the femora are known of *Thecodontosaurus Browni*. If the femur of *Thecodontosaurus Browni* and that of the present specimen are given the same length as that of *Dromicosaurus*, and the lower end of the femur of *Massospondylus carinatus* be given the same length as the lower end of the *Dromicosaurus* femur, then the other measurements become as tabulated below (in centimetres):

	Length	Proximal end to trochanter major	Proximal end to lower end trochanter IV	Lower end trochanter IV to distal end
Dromicosaurus gracilis	49·5	7·5	21·5	28
Thecodontosaurus Browni	49·5	8·25	22·7	26·8
Present specimen	49·5	8·77	23·34	26·16
Massospondylus carinatus	—	11·5	—	28

These measurements show that there is a fairly big difference between the femora of *Dromicosaurus gracilis* and of *Thecodontosaurus Browni*, and also between those of our present specimen and of *Massospondylus carinatus*. The difference, however, between the femur of *Thecodontosaurus Browni* and that of the present form is very slight. The difference is so slight that, together with the consideration that our specimen is badly preserved, I do not feel myself justified in ascribing them to different species.

The genus to which they belong cannot be *Dromicosaurus*. Except the difference in the femora, there is a great difference in the relation of femur and tibia. The tibia is relatively much longer, with regard to the femur, in the present form than in *Dromicosaurus*. As preserved, the articulatio iliaca of the ischium of the present form makes a much larger angle with the general long axis of the bone than that of *Dromicosaurus*. It is difficult to conceive that this could be the result of pressure alone. The proximal hollow surface between the articulatio iliaca and the articulatio ischio-pubica seems to be relatively larger in *Dromicosaurus*. Could the required genus be *Massospondylus*? It is difficult to say. The ileum of *Massospondylus carinatus* is practically the same as in the present form, but the trochanter major lies relatively so much lower in *Massospondylus carinatus*. However, this is the only principal difference which I could find. Considering the bad condition of the present specimen I think it will be better to place it in the genus *Massospondylus* and keep it there till it can be definitely proven to belong somewhere else.

Some time ago our collector at Harrismith found some *Dinosaurian* remains on the commonage. They consist of a vertebra and some phalangeal bones, and although they could not be identified as to genus or species, they are here described because they are so well preserved and because the vertebra shows a remarkable vertical ridge, running upwards from the articulation surface for the capitulum costae. There is no indication whatever that these bones belong to one individual.

VERTEBRA.

The vertebra is the first dorsal (Pl. XXIII). The length of its centrum near the neural suture is 7·2 cm. The distance between the lower ends of the articulation surfaces is 7·7 cm. The height of the anterior articulation surface 6·7 cm. and its breadth is about 5 cm. The height of the posterior articulation surface is 6·2 cm. and its breadth 5·4 cm. The centrum possesses a tremendously narrow keel, the lower border of which is nearly straight. The articulation surface for the capitulum costae lies slightly in front of the middle of the centrum and borders on the centro-neural suture. It also lies nearly straight below the large concavity under the processus transversus. It is a deeply concave surface, which is bordered by a high wall, and which is open behind. Its hinder margin, however, lies higher than the nearest surface of the centrum and is therefore a ridge. This ridge continues upwards and through its sigmoidal shape its upper end lies straight above the middle of the parapophysis. Here it is prominent, but its height diminishes as it continues until it disappears well between the two downward ridges from the processus transversus and nearer to the anterior than to the posterior one. There is a small knob immediately below the parapophysis. Both transverse processes have been broken off, the left one near its origin, and the right one in such a way that the hinder border of its distal end is still preserved. The processus is directed slightly backwards and what is left of its upper surface slopes outwards and slightly upwards. The processus is supported below by two ridges, which diverge downwards under an acute angle. The outer edge of the posterior ridge is thicker and stands further outwards than that of the anterior ridge. The distal end of the processus may have been triangular and is much thicker than its proximal end. The lower angle of this triangle is prolonged into a small, downwardly directed knob. The spaces between the processus transversus and the zygapophyses are roofed in by a thin sheet of bone. The space between the supporting ridges of the processus and these bony roofs is occupied by deep pits, the hinder one of which is deeper than the anterior one. The whole upper surface of these bony roofs and of the processus transversus, which is flat as far as preserved, slopes forwards and downwards. There are also supporting ridges below the zygapophyses. All the supporting ridges of one side form together the letter W. The praezygapophyses are broken off. The postzygapophyses project beyond the articulation surface of the centrum. Their articulation surfaces converge downwards under an acute angle. There is a deep groove between the postzygapophyses which runs forwards and cuts into the hinder edge of the processus spinosus. The processus spinosus is very narrow and thick; its upper end is damaged. Both articulation surfaces of the centrum are concave, however, the hinder one more so than the anterior one. The neural canal has an anterior height of 2·1 cm. and breadth of 2·6 cm. and a posterior height of 2·4 cm. and breadth of 1·9 cm. In the middle its height is about 4·5 cm. and its breadth about 1·9 cm.

FOOT.

There is a proximal end of metatarsale III. The proximal surface is slightly concave. The anterior border is broken off. The medial border is fairly straight and slightly convex in its hinder portion. Length of medial border 5·2 cm., of anterior border 3·2 cm. and of lateral border probably about 4·5 cm. Length of whole piece 5 cm.

The first phalanx of the first left toe. The bone has apparently not suffered from pressure. Length 5·8 cm., proximal breadth 3·5 cm., proximal thickness

3·2 cm., distal posterior breadth 2·8 cm., distal anterior breadth 1·6 cm., distal thickness 2·4 cm. The contour of the proximal articulation surface is trapezoidal. The posterior border is much higher than the anterior one. The lateral side of the articulation surface is deeper than the medial side. The distal end is greatly twisted to the medial side. The contour of the distal end is also trapezoidal. It is not symmetrical. The articulation surface passes higher upwards posteriorly than anteriorly and its medial side projects further backwards. The collateral pits are large.

Another phalanx is the first of the second right toe. It is a first phalanx because of its evenly concave proximal articulation surface. It is one of the right side because the lateral portion of its distal articulation surface projects further downwards. It cannot be the first phalanx of the first toe, because of the pit on the distal end of the anterior surface and because of the depth of this pit and the thickness of the proximal end as compared with the proximal breadth. I take it to be the first phalanx of the second toe. Length 5·5 cm., proximal breadth 3·7 cm., proximal thickness 3·5 cm., distal posterior breadth 3·4 cm., distal anterior breadth 2·4 cm. and distal thickness 2·5 cm. The axis of the practically cylindrical proximal articulation surface is not parallel with the hinder border of this surface, but converges with it towards the lateral side. This means that the bone is slightly turned to the medial side, when it occupies its natural position. The medial portion of the pulley-shaped distal articulation surface projects further backwards than the lateral portion.

RESULTS.

The main results from the preceding work are here enumerated:

1. Two new genera of the *Theropoda* have been described.

2. Another form has been doubtfully referred to a very little known species.

3. A redescription is given of *Gryponyx transvaalensis* BROOM.

4. A remarkable difference has been found between the pubic neck of the *Plateosaurid Eucnemesaurus* and that of the *Anchisaurid Dromicosaurus*. It could not be ascertained whether this difference is of family value.

5. The femur of *Eucnemesaurus* disproves the generality of the rule that *Theropod* limb-bones are hollow. Perhaps this rule should be restricted to *Anchisaurids*.

6. v. HUENE draws attention to the peculiar shape of the distal end of the tibia of *Euskelesaurus* and of *Gresslyosaurus*. Both these tibiae differ from all other *Theropoda*. It has now been shown that the published figures of the tibia of *Gresslyosaurus* agree with the tibia of all other *Theropoda*, but disagree with the accompanying description.

7. The *Anchisaurid Dromicosaurus* is shown to have distally coalesced pubes, a fact hitherto regarded typical of the *Plateosauridae*.

8. A great difference is shown to exist between the ischium of the *Anchisaurid Dromicosaurus* and that of the *Plateosaurid Teratosaurus*. Could this difference be of family value?

9. Another great difference is pointed out between the *Anchisaurid Dromicosaurus* and *Plateosaurus Quenstedti*. Could this also be of family value?

10. What has been accepted to be the left lower arm of European *Plateosaurids* is shown to be really the right lower arm.

PLATES XI TO XXIII

PLATE XI.

Eucnemesaurus fortis.

Fig. 1. Lateral view of left tibia. $\times \frac{1}{4}$.
,, 2. Posterior view of left tibia. $\times \frac{1}{4}$.
,, 3. Medial view of upper end of left pubis. $\times \frac{1}{2}$.
,, 4. Anterior view of upper end of left pubis. $\times \frac{1}{2}$.


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PLATE XII.

Eucnemesaurus fortis.

Fig. 1. Lateral view of upper half of left femur. The upper ends of the trochanter major and the trochanter quartus are well visible. Slightly more than $\times \frac{1}{3}$.

,, 2. View of polished lower end of the femur of fig. 1. Natural size.

,, 3. Right side view of centrum of dorsal vertebra. $\times \frac{1}{2}$.

,, 4. Upper view of centrum of dorsal vertebra. $\times \frac{1}{2}$.

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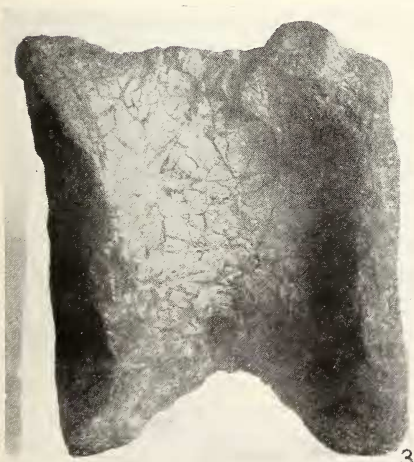

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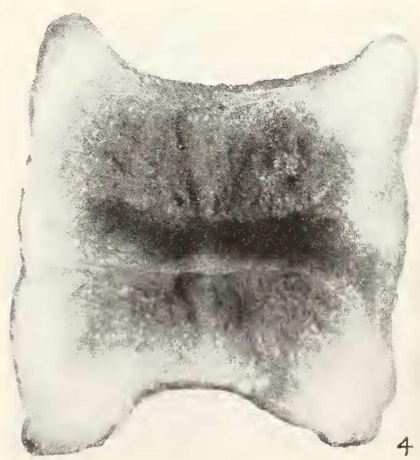

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PLATE XIII.

Eucnemesaurus fortis.

Fig. 1. Left side view of caudal vertebrae. About $\frac{1}{4}$ nat. size.

Dromicosaurus gracilis.

,, 2. Anterior view of left femur $\times \frac{1}{4}$. The foramen nutritivum is well shown above the middle of the bone.

,, 3. Lateral view of left femur. $\times \frac{1}{4}$.

,, 4. Posterior view of left femur. $\times \frac{1}{4}$.

,, 5. Postero-lateral view of proximal end of left radius. Slightly more than $\times \frac{1}{3}$.

,, 6. Proximal articulation surface of left radius. Nat. size. The anterior end is at the left-hand side

,, 7. Lateral view of the distal end of the right metatarsale III. Slightly more than $\times \frac{1}{3}$.

,, 8. Lateral view of the distal end of the right metatarsale I Slightly more than $\times \frac{1}{3}$.

PLATE XIV.

Dromicosaurus gracilis.

Fig. 1. Anterior view of right tibia. Slightly more than $\times \frac{1}{3}$.

,, 2. Lateral view of right tibia. Slightly more than $\times \frac{1}{3}$.

,, 3. Posterior view of right tibia. Slightly more than $\times \frac{1}{3}$. The head is very much foreshortened in this figure, but its correct shape and position will be clear after comparison with figs. 1 and 2.

,, 4. Anterior view of the distal end of the right metatarsale III. $\times \frac{1}{2}$.

,, 5. Lateral view of the proximal end of the left metatarsale III. $\times \frac{1}{2}$.

,, 6. Anterior view of the distal half of the humerus. Slightly more than $\times \frac{1}{2}$.


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PLATE XV.

Dromicosaurus gracilis.

Fig 1. Lateral view of right fibula. × $\frac{1}{3}$.
,, 2. Anterior view of right fibula. Slightly more than × $\frac{1}{3}$.
,, 3. Medial view of right fibula. × $\frac{1}{3}$.
,, 4. Posterior view of the ischia, as preserved. × $\frac{1}{4}$.
,, 5. Lateral view of distal end of right ischium. × $\frac{1}{2}$.
,, 6. Medial view of proximal end of left ischium. × $\frac{1}{2}$. The articulatio iliaca is above and the articulatio pubica at the lower right-hand border.


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PLATE XVI.

Dromicosaurus gracilis.

Fig. 1*a*. Left side view of two anterior caudal vertebrae. Slightly more than $\times \frac{1}{2}$. The distal ends are to the right.

,, 1*b*. Left side view of an anterior caudal vertebra, posterior to those of fig. 1*a*. Slightly more than $\times \frac{1}{2}$.

,, 1*c*. View of the lower surface of an anterior caudal vertebra, posterior to that of fig. 1*b*. Slightly more than $\times \frac{1}{2}$.

,, 2. Medial view of the proximal end of the left pubis. $\times \frac{1}{2}$.

,, 3. Left side view of the third neck vertebra. Slightly less than $\times \frac{1}{2}$.

,, 4. Anterior view of the remains of the right pubis. $\times \frac{1}{4}$.

,, 5. Anterior view of the remains of the left pubis. $\times \frac{1}{4}$. The pubes are placed with their medial sides facing each other.

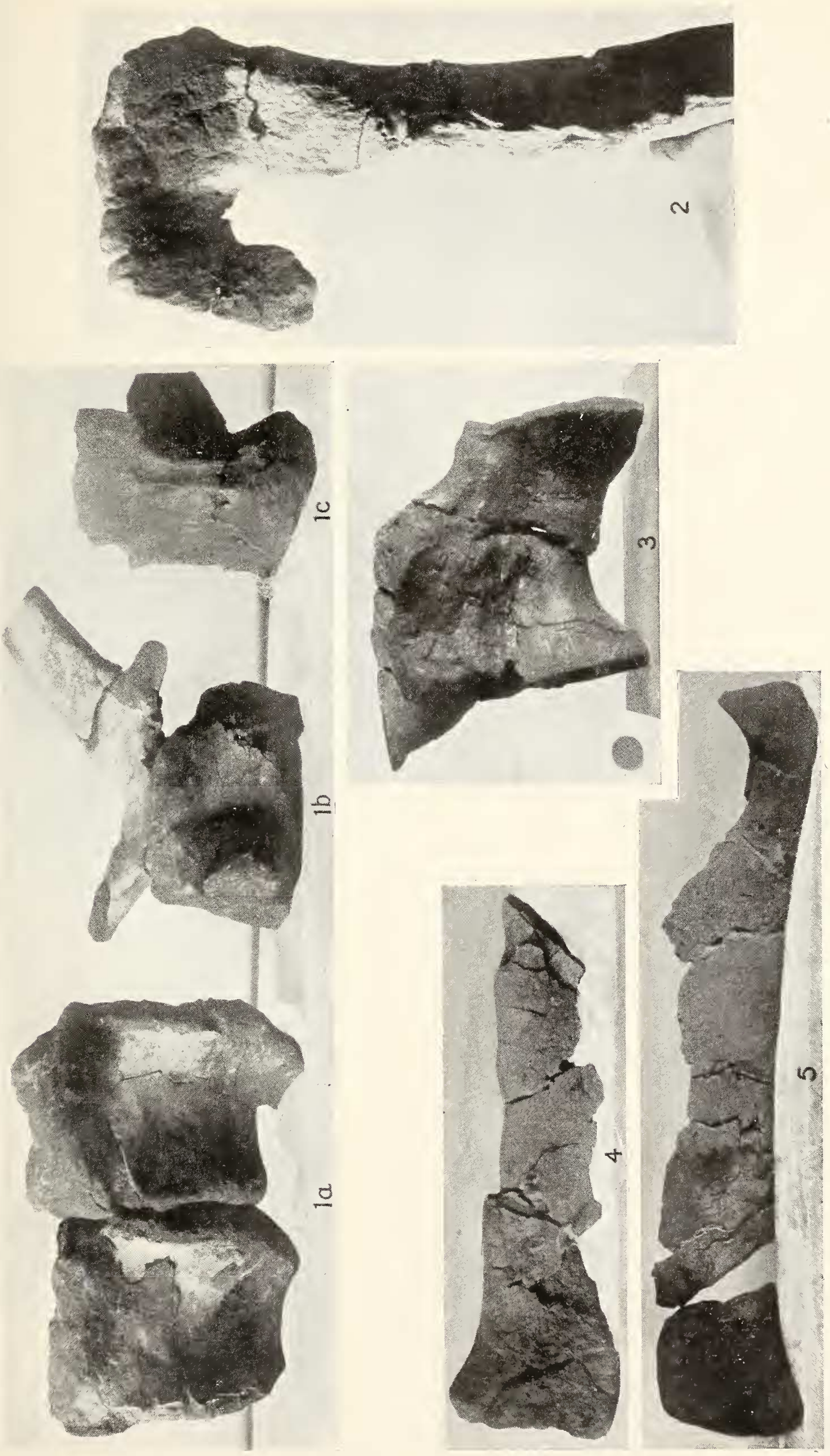
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PLATE XVII.

Massospondylus Browni.

Fig. 1. Lateral view of right scapula and coracoid. $\times \frac{1}{3}$.

,, 2. Lateral view of the left humerus. Slightly more than $\times \frac{1}{2}$. The circular depression on the posterior surface of the crista radialis is well visible.

,, 3. Anterior view of the left humerus. $\times \frac{1}{2}$.

,, 4. Lateral view of left clawphalanx I. Nat. size.

,, 5. Anterior view of first carpale of the left hand. Nat. size.

,, 6. Anterior view of second carpale Nat. size.

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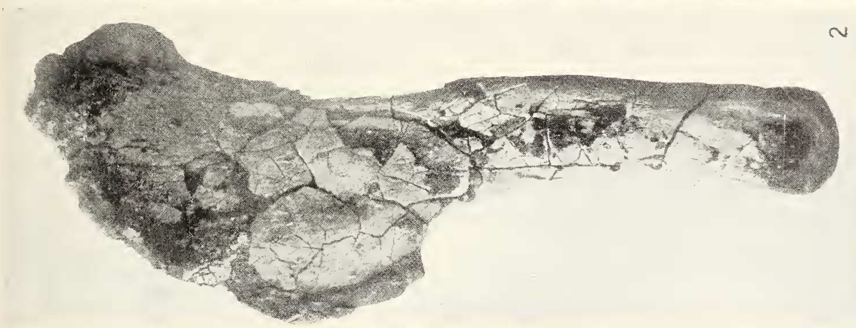

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PLATE XVIII.

Massospondylus Browni.

Fig. 1. Antero-medial view of left radius. $\times \frac{2}{3}$.
,, 2. Antero-medial view of left ulna. Slightly more than $\times \frac{2}{3}$.
,, 3. Antero-lateral view of left radius. Slightly less than $\times \frac{2}{3}$.
,, 4. Postero-medial view of left ulna. $\times \frac{2}{3}$.
,, 5. Upper view of left hand. The reconstruction is meant to show the hand at rest. Slightly more than $\times \frac{2}{3}$.


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PLATE XIX.

Massospondylus Browni.

Fig. 1. Supero-lateral view of left hand. $\times \frac{2}{3}$.
,, 2. Lateral view of left ileum. $\times \frac{1}{2}$.
,, 3. Anterior view of right pubis. $\times \frac{1}{3}$.
,, 4. Lateral view of right ischium. Slightly more than $\times \frac{1}{3}$.

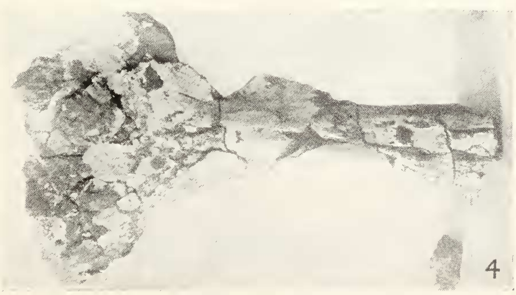

PLATE XX.

Massospondylus Browni.

Fig. 1. Anterior view of left femur. $\times \frac{1}{3}$.
,, 2. Lateral view of left femur. Slightly more than $\times \frac{1}{3}$.
,, 3. Medial view of right fibula. $\times \frac{1}{3}$.
,, 4. Anterior view of right tibia. $\times \frac{1}{3}$.
,, 5. Left side view of the sixth to the tenth caudal vertebrae. $\times \frac{1}{4}$.


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PLATE XXI.

Massospondylus Browni.

Fig. 1. Upper view of right foot. The reconstruction is meant to show the foot at rest. Slightly more than $\times \frac{1}{3}$.

,, 2. Left side view of 10th dorsal vertebra. Slightly more than nat. size.

,, 3. Left side view of the five last neck vertebrae. $\times \frac{1}{4}$.

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PLATE XXII.

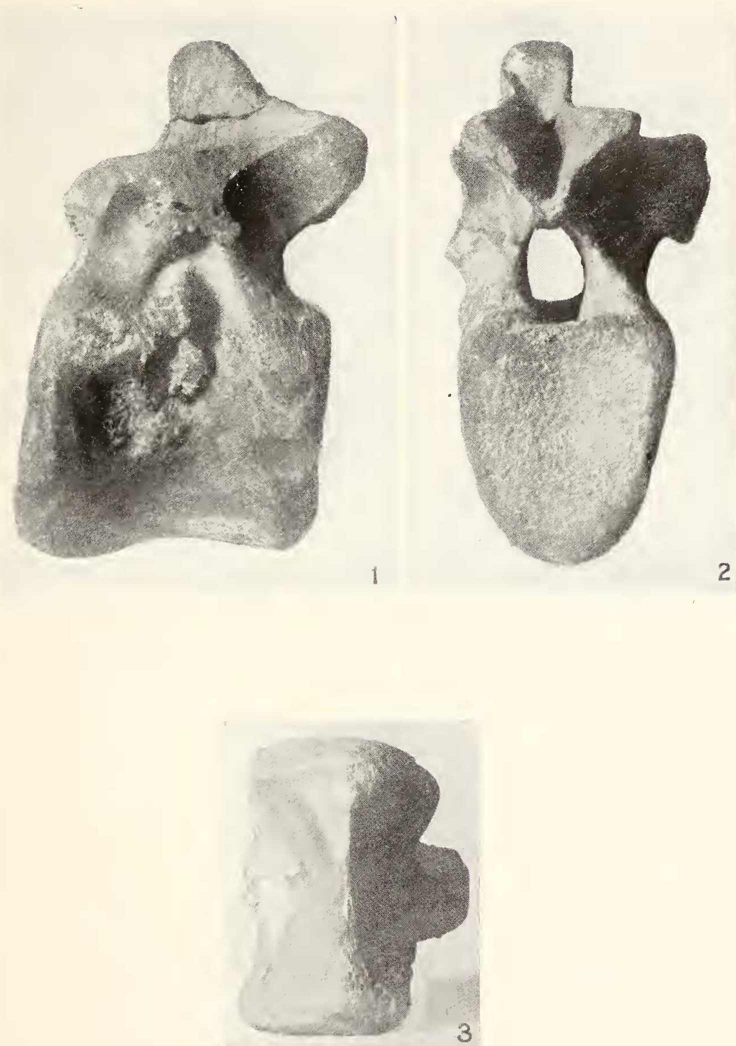
Massospondylus Browni.

Supero-lateral view of right foot. $\times 0{\cdot}53$.

PLATE XXIII.

Dinosaur Vertebra.

Fig. 1. Left side view. Slightly more than $\times \frac{1}{2}$.
,, 2. Posterior view. Slightly more than $\times \frac{1}{2}$.
,, 3. Ventral view. $\times \frac{1}{2}$. The right side of the bone is on the right side of the figure.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In conclusion I beg to thank Mr H. WALKER of St Fort and Mr W. H. MOORE of Slabberts for their generosity; and Mr S. H. HAUGHTON of Cape Town for valuable information. My thanks are also due to the Director of the South African Museum, Cape Town, for the loan of v. HUENE'S "Die Dinosaurier der europäischen Triasformation," and, last but not least, to its author, for without the assistance of his great work I would not have been able to describe our material.

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